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For information on additional testing methods for fuels:

–Cloud Point and Pour Point of Petroleum Oils
–please refer to pages 132-133
–Oxidation Stability of Distillate Fuel Oil (Accelerated Method)
–please refer to pages 120-122
–Please refer to the Viscosity, Flash Point and General Tests Sections
–Additional test methods are available upon request
–please call or write for information

Oxidation Stability of Gasoline and Aviation Fuels

Oxidation Stability of Gasoline (Induction Period Method)
Oxidation Stability of Aviation Fuels (Potential Residue Method)

Test Method

Provides an indication of the tendency of gasoline and aviation fuels to form gum in storage. The sample is oxidized inside a stainless steel pressure vessel initially charged with oxygen at 100psi (689kPa) and heated in a boiling water bath. The amount of time required for a specified drop in pressure (gasoline) or the amount of gum and precipitate formed after a specific aging period (aviation fuels) is determined.

Oxidation Stability Test Apparatus

- Conforms to ASTM D525, D873, ISO 7536 and related specifications
- Oxidata® Pressure Measurement System
- Available in two, four or six-unit configurations
- Choice of water/liquid or solid block heating baths
- Oxidation pressure vessel incorporates burst disk assembly

Consists of Oxidation Pressure Vessel, Pressure Measurement Equipment, Oxidation Bath and Accessories.

Ordering Information

Oxidation Pressure Vessel	*page 80*
Oxidation Baths	*pages 81-82*
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Accessories	*pages 81-82*

Oxidata® Pressure Measurement System

For Oxidata® specifications and ordering information refer to pages 83-84.

K10500 Oxidation Pressure Vessel

Oxidation Pressure Vessel

Precision machined stainless steel pressure vessel includes threaded body; lid; stem with filler rod and mounting flange; needle valve for purging, pressurizing and exhausting pressure vessel with oxygen; and burst disk assembly. Pressure vessel interior and inside of stem have a high polish to facilitate cleaning and prevent corrosion. Stainless steel burst disk ruptures at 223psi (1537kPa) to prevent unsafe pressure build-up inside pressure vessel. Octagonal sections on the pressure vessel and lid permit tight closure with wrench. Includes buna-N gaskets. See Accessories on pages 81-82 for available rupture disk assembly retrofit for existing pressure vessels. Can also be used as a pressure vessel in ASTM D5304 "Standard Test Method for Assessing Distillate Fuel Storage Stability by Oxygen Overpressure".

Ordering Information

Catalog No.	
K10500	Oxidation Pressure Vessel

Solid Block Oxidation Baths

- Solid block baths conforming to ASTM and related specifications. Constant temperature baths for heating K10500 Oxidation Pressure Vessels in accordance with ASTM specifications.

Solid Block Baths–Insulated aluminum block baths available in two or four-unit capacity. Baths feature microprocessor temperature control with built-in overtemperature protection and dual LED displays for setpoint and actual temperature values in °C/°F format. The solid block design offers operating advantages over the boiling water bath, and meets temperature control and other requirements of ASTM and related methods. It should be noted, however, that many applicable specifications for this test method call for a liquid bath medium. Housed in an insulated steel cabinet with chemical-resistant polyurethane enamel finish. Includes lids for pressure vessel ports. Order thermometer separately.

Communications software (RS232, etc.) ramp-to-set and other enhanced features are available on the solid block and 4-6 place liquid baths as extra cost options. Contact your Koehler representative for information.

Specifications

Conforms to the specifications of: ASTM D525, D873; IP 40, IP 138; ISO 7536; DIN 51780, 51799; FTM 791-3352, 791-3354; NF M 07-012, 07-013
Maximum Temperature:
Solid Block Baths: 250°F (121°C)

Solid block baths meet temperature control and other requirements of ASTM and related methods. While the aluminum block design offers operating advantages over the standard boiling water bath, it should be noted that many applicable specifications for this test call for a liquid bath medium. Please refer to the test method for the specific requirements.

Ordering Information

Type	Catalog No.		Electrical Requirements CE	Heater Range	Dimensions lxwxh,in.(cm)
Solid Block	**K10401**	2 vessels	115V 60Hz 12A	0-1300W	15x10x17 (38x25x43)
	K10491		220-240V 50/60Hz 6A		
	K10403	4 vessels	115V 60Hz 22A	0-2500W	24x10x17 (61x25x43)
	K10493		220-240V 50/60Hz 11A		

Software compatible, inquire with Koehler Customer Service.

K10491 Solid Block Oxidation Bath

Ordering Information

Catalog No.	
	Accessories
K10540	Glass Sample Container and Cover with pour out spout
K10540/C	Glass Sample Container Cover Only
K10510	Gasket. Replacement composition gasket for K10500 Oxidation Pressure Vessel
K10551	Pressure Line. For pressurizing Oxidation Pressure Vessel. 6 ft. (1.83m) long, with quick release coupling for needle valve on pressure vessel and threaded fitting for oxygen tank
K10556	Oxygen Manifold Pressure Relief System Connects to oxygen source to prevent overcharging of vessel. Equipped with relief valve to vent at 125psi and 300 series stainless steel 150psi burst disk assembly. Constructed from 300 series stainless steel. Cleaned for oxygen service
K10520	Wrench. For tightening seal on Oxidation Pressure Vessel
K10530	Table Socket. Installs in benchtop to aid in tightening seal on Oxidation Pressure Vessel
K10560	Bronze Tubing For connecting pressure recorder to vessel. Flexible seamless helical tubing with protective armor braid and connections. 5 ft (1.52m) long
K10525	Burst Disk Assembly Retrofit kit for Oxidation Pressure Vessel without burst disk assembly
250-000-22F	ASTM 22F Thermometer Range: 204 to 218°F
250-000-22C	ASTM 22C Thermometer Range: 95 to 103°C

Koehler INSTRUMENT COMPANY, INC.

Oxidation Stability of Gasoline and Aviation Fuels

K10404 Liquid Oxidation Bath with K10500 Pressure Vessels

Water/Liquid Oxidation Baths

- Water/liquid baths conforming to ASTM and related specifications. Constant temperature baths for heating K10500 Oxidation Pressure Vessels in accordance with ASTM specifications.

Water/Liquid Baths–Two different models, both equipped with low liquid-level controllers in accordance with the latest ASTM specifications. Two-unit analog controlled water bath can be flush mounted in a table top if desired, and is equipped with an overflow standpipe/drain to maintain the proper depth when the pressure vessels are inserted, and a plated brass reflux condenser to minimize evaporation loss.

The six unit model can be used with water or oil as a bath medium, and has microprocessor temperature control that provides quick temperature stabilization without overshoot. Dual LED displays provide setpoint and actual temperature values in °C/°F format. A built-in overtemperature control circuit interrupts power should the bath temperature exceed a programmed cut-off point. Both models feature double-wall insulated construction with stainless steel tanks, support racks and port covers. Order thermometer separately. *The 6 unit model can be ordered with interchangeable racks for performing the ASTM D942, ASTM D323 and D1298 test methods–please contact your Koehler representative for additional information.*

Communications software (RS232, etc.) ramp-to-set and other enhanced features are available on the solid block and 4-6 place liquid baths as extra cost options. Contact your Koehler representative for information.

Specifications

Conforms to the specifications of: ASTM D525, D873; IP 40, IP 138; ISO 7536; DIN 51780, 51799; FTM 791-3352, 791-3354; NF M 07-012, 07-013

Maximum Temperature:

2 Unit Water/Liquid Bath: boiling water

6 Unit Water/Liquid Bath: 250°F (121°C)

Solid block baths meet temperature control and other requirements of ASTM and related methods. While the aluminum block design offers operating advantages over the standard boiling water bath, it should be noted that many applicable specifications for this test call for a liquid bath medium. Please refer to the test method for the specific requirements.

Ordering Information

Type	Catalog No.		Electrical Requirements CE	Heater Range	Dimensions lxwxh,in.(cm)
Water/ Liquid	**K10400** Analog	2 vessels	115V 60Hz 17.3A	0-2000W	24x14x24 (61x36x61)
	K10402 Analog		220-240V 50/60Hz 9.0A		
	K10404 Digital	6 vessels	220-240V 50/60Hz 18.1A	0-3000W	24x14x29½ (61x36x75)

Ordering Information

Catalog No.	
	Accessories
K10540	Glass Sample Container and Cover with pour out spout
K10540/C	Glass Sample Container Cover Only
K10510	Gasket. Replacement composition gasket for K10500 Oxidation Pressure Vessel
K10551	Pressure Line. For pressurizing Oxidation Pressure Vessel. 6 ft. (1.83m) long, with quick release coupling for needle valve on pressure vessel and threaded fitting for oxygen tank
K10556	Oxygen Manifold Pressure Relief System Connects to oxygen source to prevent overcharging of vessel. Equipped with relief valve to vent at 125psi and 300 series stainless steel 150psi burst disk assembly. Constructed from 300 series stainless steel. Cleaned for oxygen service
K10520	Wrench. For tightening seal on Oxidation Pressure Vessel
K10530	Table Socket. Installs in benchtop to aid in tightening seal on Oxidation Pressure Vessel
K10560	Bronze Tubing For connecting pressure recorder to vessel. Flexible seamless helical tubing with protective armor braid and connections. 5 ft (1.52m) long
K10525	Burst Disk Assembly Retrofit kit for Oxidation Pressure Vessel without burst disk assembly
250-000-22F	ASTM 22F Thermometer Range: 204 to 218°F
250-000-22C	ASTM 22C Thermometer Range: 95 to 103°C

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Oxidata® Pressure Measurement Systems

- Electronic pressure measurement systems exclusively designed for ASTM oxidation test methods
- Powerful Oxidata® software for Windows® environments
- Monitors up to twelve pressure and four temperature channels
- Automatic end-point detection
- Real-time average bath temperature display
- Can be installed to most manufacturer's fuels oxidation test apparatus

Complete electronic measurement systems for plotting pressure versus time and temperature in oxidation testing of fuels. Each system includes transducers, multiplexer, data acquisition card, software, and mounting and connecting hardware. Systems are available in two, three and four pressure vessel configurations, and additional channels can be added for up to a total of twelve pressure and four temperature channels.

Koehler's pressure measurement systems for fuels oxidation testing features Oxidata®, a high accuracy pressure measurement software package designed exclusively for ASTM oxidation test methods. Designed to run in a Windows® 2000 or Windows XP environment, Oxidata® monitors up to twelve samples simultaneously, with graphical or tabular display of results. Each channel can be independently configured for any of the applicable ASTM standard test methods without compromising the independence or accuracy of the other channels. Independent start and stop times and user programmable end points add even greater flexibility.

The software plots your data on screen on line, real time, and automatically saves your data on disk or to the hard drive during the test to prevent loss of valuable data. Multiple display options include the ability to view the status of all twelve pressure channels on screen simultaneously and then click on any one channel for a graph display; or to view four channels in graphical format simultaneously. Powerful program features allow you to change axes, have colored plot lines and zoom in on a specific plot sector to view data in greater detail.

Oxidata® software automatically detects the break point and induction period.

Oxidata® Features and Specifications

- On line, real time monitoring of up to twelve samples simultaneously – results plot directly to the screen for instant monitoring or printout of results
- Automatic detection and reporting of break point and induction period
- Invalid test indication when a pressure leak is detected
- Menu options for fuels oxidation testing and other ASTM oxidation tests
- Programmable automatic end point detection with graphical and tabular representation
- Each channel can be configured and operated independently with different start/stop times and different ASTM test methods
- Zoom in feature allows for magnification of any plot sector on any channel for a more detailed study
- Monitors and reports temperatures of as many as twelve pressure vessels simultaneously using accessory RTD's, and calculates and displays average temperature for each bath
- Exports data to spreadsheet programs such as Microsoft Excel®, Lotus 1-2-3® etc.
- Temperature and pressure calibration capability
- Data is saved directly to the disk or hard drive during testing to prevent loss of valuable data
- Operates in Windows® 2000 and Windows XP environments

Included Accessories (for the pressure measurement systems)

Transducers (connects directly to pressure vessel)
USB interface
Multiplexer
Oxidata® software
RTD probe assembly (1)
Connecting cables and hardware

Computer Requirements

Processor: Intel® Pentium II or similar (minimum)
Memory (RAM): 256MB or higher
Speed: 500 MHz or higher
Windows® 2000 or higher
Disk Space: 15 MB free space (minimum)
Communications Port: One USB port
Other Software: Microsoft® Excel (97 or above)
One RS232 port for temperature controller (optional)

Oxidation Stability of Gasoline and Aviation Fuels

Real-time plot screens display pressure versus time for up to twelve samples simultaneously (four different test methods shown).

Ordering Information

Catalog No.

The ordering information below is for installation to existing Koehler equipment. For other makes of equipment, a few basic hardware items may also be required – please contact your Koehler representative for assistance.

Oxidata® Pressure Measurement System for Fuels Oxidation CE

K10504-XP	2-Unit System, 115V 60Hz
K10594-XP	2-Unit System, 220-240V 50/60Hz
K10505-XP	4-Unit System, 115V 60Hz
K10595-XP	4-Unit System, 220-240V 50/60Hz
K10506-XP	6-Unit System, 115V 60Hz
K10596-XP	6-Unit System, 220-240V 50/60Hz

Accessories

K10504-0-1	Transducer
K70519	RTD Kit, for monitoring the temperature of an additional bath

Mechanical Pressure Measuring and Recording Equipment

- One-pen or two-pen mechanical recorders
- Pressure gauge for aviation fuel tests

Mechanical Recorders—Spring-wound circular chart recorder measures pressure inside oxidation pressure vessel for break point and induction period determinations on gasoline. Housed in a steel case suitable for wall mounting. Order accessory bronze tubing for connection to oxidation pressure vessel. Suitable for oxygen service. Includes 100 24-hour charts.

Pressure Gauge for Aviation Fuel Tests—Suitable for testing of aviation fuels according to ASTM D873. Range 0-200psi. Suitable for oxygen service.

Ordering Information

Catalog No.

Mechanical Recorders

K10570	One-Pen Recorder
K10580	Two-Pen Recorder

Pressure Gauge for Aviation Fuel Tests

K10590	Pressure Gauge

Accessories

308-000-005	Recorder Charts Pack of 100
308-001-02R	Recorder Cartridge Pen, Red (for use with K10570 Recorder)
308-001-02B	Recorder Cartridge Pen, Blue (for use with K10570 and K10580 Recorders)
308-001-L2R	Recorder Cartridge Pen, Long Red (for use with K10580 Recorder)

Assessing Distillate Fuel Storage Stability by Oxygen Overpressure

Test Method

Used for assessing potential storage stability of middle distillate fuels, including fuels with or without stabilizer additives, and freshly refined or previously stored fuels. The sample is aged in a pressurized vessel at constant temperature for 16 hours and, after cooling, the total amount of insoluble products is determined gravimetrically.

Pressure Vessel

- Conforms to the specification of ASTM D5304
- Four, Six and Ten unit models

Stainless steel pressure vessels accommodate multiple sample containers for determining storage stability of fuels by the oxygen overpressure method. Vessels meet all applicable ASME and ASTM safety requirements for construction and working pressure and maximum operating temperature and are equipped with pressure safety valves factory present at 200psi (1,332kpa). Included with each model are a collapsible glassware rack that installs and removes easily for cleaning, oxygen inlet and outlet valves with quick disconnect fittings and charging hose, pressure gauge and wide-mouth closure with viton O-ring seal.

Specifications

Conforms to the specifications of:
ASTM D5304
Capacity: Four, six or ten sample containers
Construction: 316 stainless steel, in accordance with ASME specifications
Working Pressure at 90˚C: Exceeds ASTM requirements
Safety Relief Valve Setting: 200psi (1,332kPa)
Pressure Gauge: 0-200psi

Included Accessories

Glassware rack, hinged, for four, six or ten sample containers
Charging hose with pressure tight crimp and quick disconnect

Dimensions:

K10600: 8½" high by 9½" round
Net Weight: 14 lbs (6.4kg)
K10601/K10602: 15½" high by 9½" round
Net Weight: 17 lbs (8kg)

Shipping Information:

K10600:
Shipping Weight: 17 lbs (8kg)
Dimensions: 2.6 Cu. Ft.
K10601/K10602:
Shipping Weight: 22 lbs (10kg)
Dimensions: 3.5 Cu. Ft.

K10600 Pressure Vessel, 4 Unit

Ordering Information

Catalog No.		Order Qty
K10600	Pressure Vessel, 4 Unit	1
K10601	Pressure Vessel, 6 Unit	
K10602	Pressure Vessel, 10 Unit	
	Accessories	
K10540	Sample Container with lid	

Existent Gum in Fuels by Jet Evaporation

Test Method

Gum formed during fuel storage can deposit on induction system surfaces, intake valves, stems and guides. To test for gum content, a 50mL sample is evaporated in an aluminum block bath for a specified period under controlled conditions of temperature and flow of air (aviation and motor gasolines) or steam (aircraft turbine fuel).

Existent Gum Test Apparatus

Evaporates aircraft turbine fuel and motor and aviation gasoline samples under controlled conditions in accordance with ASTM specifications. Consists of a high temperature evaporation bath with 100mL test beakers and, for aircraft turbine fuels, a steam generator and steam superheater.

Evaporation Baths

- Conforming to ASTM D381 and related specifications
- Choice of three-unit and six-unit models
- Available with built-in steam superheater
- Microprocessor programmable high accuracy temperature control
- Built-in pressure regulators and air flowmeters

Electrically heated baths for determining existent gum in aircraft turbine fuels by steam-jet evaporation and in motor and aviation gasolines by air-jet evaporation. Fully insulated, aluminum block design assures safe, efficient high temperature operation. Equipped with air/steam pressure regulator with gauge and a flowmeter for adjusting air flow per ASTM specifications. Stainless steel jets deliver air or steam flow to the test wells through removable brass conical adapters. Microprocessor PID control provides quick temperature stabilization without overshoot, and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.*

Model K33800 with Built-in Superheater–Six-unit bath with a built-in thermostatically controlled superheater which delivers dried steam to the bath inlet for steam-jet method testing of aircraft turbine fuels. Has digital-indicating solid state bath temperature control with digital setpoint and display.

Model K33700–Six-unit bath without built-in superheater.

Model K33780–Three-unit bath without built-in superheater. All controls are housed in the bath cabinet.

Ordering Information

Catalog No.	
K33800	Existent Gum Evaporation Bath, 6-Unit with Superheater, 220-240V 50/60Hz
K33700	Existent Gum Evaporation Bath, 6-Unit, 220-240V 50/60Hz
K33780	Existent Gum Evaporation Bath, 3-Unit, 115V 60Hz
K33781	Existent Gum Evaporation Bath, 3-Unit, 220-240V 50/60Hz

Software compatible, inquire with Koehler Customer Service.

K33700 Existent Gum Evaporation Bath

Specifications

Conforms to the specifications of: ASTM D381; IP 131; ISO 6246; DIN 51784; FTM 791-3302; NF M 07-004
Testing Capacity:
K33800 and K33700: 6 sample beakers
K33780 and K33781: 3 sample beakers
Maximum Temperature: 475°F (246°C)
Temperature Control Stability: ±1°F (±0.5°C)
Bath Configuration: machined aluminum block with multiple cartridge heaters
Heater Range:
K33800 and K33700: 0-3000W
K33780 and K33781: 0-1500W
Superheater: (Model K33800 only)
Superheating chamber and condensate trap constructed of stainless steel
Solid state thermoregulator (0-550°F) Heater Range: 0-1500W
Electrical Requirements: CE
K33700: 220-240V 50/60Hz, Single Phase, 13.6A
K33800: 220-240V 50/60Hz, Single Phase, 20.4A
K33780: 115V 60Hz, Single Phase, 13.0A
K33781: 220-240V 50/60Hz, Single Phase, 6.8A

Included Accessories

Conical Brass Adapters for air/steam jets

Dimensions lxwxh,in.(cm)

K33800: 32½x20x20 (83x51x51)
K33780: 32½x11x19 (83x28x48)
K33700: 28x20x16 (71x51x41)
Net Weight:
K33800: 230 lbs (104.3kg)
K33780: 85 lbs (38.6kg)
K33700: 203 lbs (92.1kg)

Shipping Information

K33800
Shipping Weight: 313 lbs (142kg)
Dimensions: 17.2 Cu. ft.
K33780
Shipping Weight: 140 lbs (63.5kg)
Dimensions: 8.3 Cu. ft.
K33700
Shipping Weight: 271 lbs (123kg)
Dimensions: 13.7 Cu. ft.

Steam Generator

- For steam-jet method testing of aircraft turbine fuels
- Meets output requirements of three-unit and six-unit evaporation baths
- Electrically heated for clean, efficient operation and ease of installation
- Meets applicable ASME, NEC standards; UL listed, CSA approved

Electrically heated boiler provides instantaneous and reserve steam capacity for steam-jet evaporation tests. Easy to install and operate; electrical heating eliminates the need for on-site fuel combustion. Requires only a water feed source and electrical hook-up. Ruggedly constructed, with long life industrial grade incoloy heating element. Includes a full range of safety features: automatic water level control and low water cut-off; steam safety valve; high-limit pressure cut-out with manual reset; steam pressure gauge.

Specifications

Output: 54.1 lbs steam/hr at 212°F
Bhp Rating: 1.83
kW Rating: 18

Dimensions lxwxh,in.(cm)

20x28x36 (51x71x91)
Net Weight: 185 lbs (83.9kg)

Shipping Information

Shipping Weight: 200 lbs (91kg)
Dimensions: 18 Cu. ft.

Ordering Information

Catalog No.	
K33850	Steam Boiler, 120/240V 60Hz, Three Phase
K33850/208601	Steam Boiler, 208V 60Hz, Single Phase, 87A
K33850/208603	Steam Boiler, 208V 60Hz, Three Phase, 50A
K33850/240601	Steam Boiler, 240V 60Hz, Single Phase, 75A
K33850/240603	Steam Boiler, 240V 60Hz, Three Phase, 43A
K33850/380603	Steam Boiler, 380V 50/60Hz, Three Phase, 27A
K33850/415503	Steam Boiler, 415V 50Hz, Three Phase, 25A
K33850/480603	Steam Boiler, 480V 60Hz, Three Phase, 22A

Other electrical configurations for the Steam Boiler are available. Please inquire with Koehler Customer Service for additional information.

K33810 Steam Superheater

Accessories

Catalog No.		Order Qty
K33710	Sample Beaker, 100mL spun copper, 50x78mm	6
332-002-017	Sample Beaker, Borosilicate Glass, 100mL	
250-000-03F	ASTM 3F Thermometer Range: 20 to 760°F	2
250-000-03C	ASTM 3C Thermometer Range: –5 to +400°C	
K33810	Steam Superheater Provides dry superheated steam for evaporation baths not equipped with a built-in superheater. Use together with an outside steam source for steam-jet method testing of aircraft turbine fuels. Superheating chamber and condensate trap are constructed entirely of stainless steel. Solid state temperature controller adjusts between 0-550°F. Equipped with steam inlet and outlet connections and condensate drain valve. Steel exterior has a chemical resistant polyurethane enamel finish. Dimensions 5x27x9½" (13x70x24cm). Shipping Weight: 23 lbs (10.4kg) 220-240V 50/60Hz, Single Phase, 6.8A CE	

Test Apparatus for Steam Jet Method

Ordering Information

Catalog No.		Order Qty
K33800	Existent Gum Evaporation Bath	1
K33850 Series	Steam Boiler	1
K33710	Sample Beaker (or 332-002-017)	6
250-000-03F	ASTM 3F Thermometer. Range: +20 to +215°F	2
250-000-03C	ASTM 3C Thermometer. Range: –5 to +400°C	

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Determination of Accelerated Iron Corrosion in Petroleum Products

Test Method

Accelerated Laboratory and Field Procedure for the determination of corrosion of iron, in the presence of water, on samples such as gasoline and gasoline blended with 10% ethanol, E10 (Specification D4814); gasoline-blend components (except butane); diesel fuel and biodiesel B5, except Grade No. 4-D (Specification D975); biodiesel B6 to B20 (Specification D7467); diesel-blend component such as light cycle-oil; No.1 fuel oil, No.2 fuel oil (Specification D396); aviation turbine fuel (Specification D1655).

Accelerated Iron Corrosion Tester

- Preset Temperature and RPM value in direct accordance with ASTM D7548
- 5" Touch Screen Control Display with Soft keys
- 4-position liquid bath
- Integrated Timer
- Small Footprint

K30260 Accelerated Iron Corrosion Tester

Specifications

Conforms to the specifications of:
ASTM D7548
Temperature Setting: 37.8°C (100°F)
Bath Tank Volume: 1.3 Gallons
Heating/Cooling: Peltier Regulating System
Stirring Speed: 100 RPM; 900 RPM

Dimensions lxwxh,in.(cm)

15x23x14 (38.1x58.5x35.5)
Net Weight: 35 lbs (15.9kg)

Electrical Requirements CE

115V 60Hz
220-240V 50/60Hz

Included Accessories

5ml Syringe with 63.5mm (2.5 in) needle
Test Jar, 90 ml capacity, flat-bottom (4)
Corrosion Test Specimen Assembly (4)
Ethernet Crossover Cable (1)
Magnetic Stirrer Bar according to ASTM (5)
Temperature Probe (4)
Test Jar Cap (4)
Port Cover (4)
O-Ring (4)
2x Lighted Magnifying Lens (1)

Ordering Information

Catalog No.	
K30260	Accelerated Iron Corrosion Tester, 115V 60Hz
K30269	Accelerated Iron Corrosion Tester, 220-240V 50/60Hz

Accessories

250-000-28F	ASTM 28F Thermometer, Range: 97.5 to 102.5°F
250-000-28C	ASTM 28C Thermometer, Range: 36.6 to 39.4°C
K30130	Polishing Chuck
K30150	Drive Motor, 115V
K30180	Drive Motor, 230V
380-100-002	Silicone Carbide Abrasive Cloth Roll, C-100 grit Open Mesh, 38mm width x 22.5m length For Preliminary grinding and final polishing of test specimens.

Water Vapor Content by Measurement of Dew Point Temperature

Test Method

Determines the water vapor content of gaseous fuels by measurement of the dew point temperature, followed by calculation of the water vapor content.

Dew Point Apparatus

- Rugged construction
- Stainless steel sample chamber with incorporated "target mirror"

The Dew Point Apparatus consists of a closed stainless steel dew point chamber containing a highly polished stainless steel "target mirror" and sample inlet and outlet control valves. The chamber is chilled by refrigerant following through the outer cooling jacket, preventing any refrigerant contact with the test sample. The thermometer is inserted into the mirror support structure, providing the temperature of the "target mirror." As the sample flows in the chamber and is deflected across the surface of the mirror, the temperature at which condensation collects on the mirror is recorded as the dew point of the sample.

Specifications

Conforms to the specifications of: ASTM D1142; GPA

Dimensions lxwxh,in.(cm)

3½x6x12¾ (9x15x32.5)
Net Weight: 6½ lbs (3kg)

Shipping Information

Shipping Weight: 11 lbs (5kg)
Dimensions: 2.5 Cu. ft.

K32230 Dew Point Apparatus with Pressure Gauge and ASTM 33C Thermometer

Ordering Information

Catalog No.		Order Qty
K32230	Dew Point Apparatus	1

Accessories

K32230-1	Pressure Gauge, 0 to 4 bar	1
K32230-2	Pressure Gauge, 0 to 40 bar	
K32230-3	Pressure Gauge 0 to 70 bar	
K32230-4	Pressure Gauge 0 to 140 bar	
250-000-33F	ASTM 33F Thermometer, range: –36.5 to +107.5°F	1
250-000-33C	ASTM 33C Thermometer, range: –38 to +42°C	
250-000-114F	ASTM 114F Thermometer, range: –112 to +70°F	1
250-000-114C	ASTM 114C Thermometer, range: –80 to +20°C1	

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Copper Strip Corrosion by Liquefied Petroleum (LP) Gases

Test Method

Tests the corrosiveness of LPG to copper by immersion of a polished test strip in the sample inside a test cylinder at elevated temperature. After one hour the test strip is removed and compared against the ASTM Copper Strip Corrosion Standards.

LPG Copper Strip Corrosion Test Apparatus

- Conforms to ASTM D1838 and related specifications
- Four-sample testing capability

Consists of LPG Corrosion Test Cylinders, Water Bath, Copper Strips, Polishing Materials and the ASTM Copper Strip Corrosion Test Standards.

LPG Corrosion Test Cylinders–Stainless steel cylinder with ¼" needle valves for purging and admitting LPG samples. Dip tube with hook suspends copper strip in sample. Knurled, threaded cap with O-ring gasket hand tightens to a positive seal. Withstands hydrostatic test pressure of 1000 psig (6895kPa).

LPG Corrosion Test Water Bath–Thermostatically controlled water bath submerges four LPG Corrosion Test Cylinders in an upright position. Controls temperature at 100 ±1°F (37.8 ±0.5°C) per ASTM specifications. Soxhlet reflux condenser and constant water level device maintain proper working depth. Polished stainless steel inner wall and powder coated steel outer wall construction. Fully insulated.

Ordering Information

Catalog No.		Order Qty
K40000	LPG Corrosion Test Cylinder	4
K39900	LPG Corrosion Test Water Bath, 115V 60Hz	1
K39990	LPG Corrosion Test Water Bath, 220-240V 50/60Hz	
	Accessories	
K40200	Copper Strip for LPG 12.5x1.5-3.0x75mm with 3.2mm hole per ASTM specifications	4
K40100	Connecting Tubing Sulfur-free plastic-lined tubing for connection of test cylinder valve to sample source. With ¼" stainless steel and aluminum connectors. 24" long	1
K25100	ASTM Copper Strip Corrosion Test Standards Colored reproductions of tarnished strips encased in a plastic plaque.	1
380-240-001	Silicone Carbide Paper, 240-grit For polishing copper strips prior to testing. Pack of 50 sheets	1
380-150-000	Silicone Carbide Grain, 150-grit For final polishing of copper strips prior to testing. 1 lb package	1
380-150-001	Silicone Carbide Paper, 150-grit For polishing copper strips prior to testing. Pack of 50 sheets	1
K25000	Polishing Vise Holds copper strip firmly in place without marring the edges. Stainless steel, mounted on a composition base	1
K25090	Multi-Strip Polishing Vise Similar to K25000 but capable of holding four strips at a time	
250-000-12F	ASTM 12F Thermometer. Range: –5 to +215°F	1
250-000-12C	ASTM 12C Thermometer. Range: –20 to +102°C	

K39900 LPG Corrosion Test Bath

K40000 LPG Corrosion Test Cylinder

Specifications

Conforms to the specifications of:
ASTM D1838; GPA 2140; ISO 6251
Water Bath Specifications:
Capacity: four (4) LPG Corrosion Test Cylinders
Maximum Temperature: 221°F (105°C)
Temperature Control Stability: ±1°F (±0.5°C)
Heater Range: 0-750W
Bath Medium: 3.8 gal (14.4L) Water
Electrical Requirements: CE
115V 60Hz, Single Phase, 6.5A
220-240V 50/60Hz, Single Phase, 3.4A

Shipping Information

Shipping Weight: 27 lbs (12.2kg)
Dimensions: 5.3 Cu. ft.

Dimensions lxwxh,in.(cm)

12x10x24 (30x25x61)
Net Weight: 19 lbs (8.6kg)

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Koehler INSTRUMENT COMPANY, INC.

Copper Corrosion from Petroleum Products

Test Method

The Copper Strip Tarnish Test assesses the relative degree of corrosivity of petroleum products, including aviation fuels, automotive gasoline, natural gasoline, solvents, kerosene, diesel fuel, distillate fuel oil, lubricating oil and other products. A polished copper strip is immersed in 30mL of sample at elevated temperature. After the test period, the strip is examined for evidence of corrosion and a classification number from 1-4 is assigned based on a comparison with the ASTM Copper Strip Corrosion Standards. For aviation fuels and natural gasoline the sample tube is placed inside a stainless steel bomb during testing.

Test Bomb Baths

Thermostatically controlled water bath immerses Copper Strip Corrosion Test Bombs at the required depth per ASTM specifications. Use for testing aviation gasoline, aviation turbine fuel and natural gasoline. Fully insulated, double-wall stainless steel construction. Soxhlet reflux condenser and constant water level device maintain proper working depth. Choice of four-bomb and eight-bomb models. Optional removable test tube rack converts four-bomb model for testing of products not requiring corrosion bomb.

Specifications: Conforms to the specifications of: ASTM D130; IP 154 FSPT DT-28-65; ISO 2160; DIN 51759; FTM 791-5325; NF M 07-015
Testing Capacity:
K25310/K25319: four (4) copper strip corrosion test bombs
K25320/K25329*: eight (8) copper strip corrosion test bombs
**or sixteen (16) test tubes with optional test rack (Catalog No. K25309) installed*
Maximum Temperature: 221°F (105°C)
Temperature Control Stability: ±1°F (± 0.5°C)
Heater Range: 0-750W
Bath Medium: 5 gal (18.9L) water
Electrical Requirements: CE
115V 60Hz, Single Phase, 7.5A
220-240V 50/60Hz, Single Phase, 4A
Temperature Control: Analog

Included Accessories

Rubber Stoppers for bomb openings (4)

Dimensions: lxwxh,in.(cm)
4-bomb model: 12x10x21 (30x25x53)
8-bomb model: 16x11½x21 (41x29x54)
Net Weight:
4-bomb model: 18½ lbs (8.4kg)
8-bomb model: 24 lbs (10.9kg)

Shipping Information

Shipping Weight:
4-bomb model: 41 lbs (18.6kg)
8-bomb model: 45 lbs (20.4kg)
Dimensions:
4-bomb model: 5.3 Cu. ft.
8-bomb model: 5.5 Cu. ft.

Ordering Information

Catalog No.	
K25310	Bath for Copper Strip Corrosion Test Bombs, 4-Unit, 115V 60Hz
K25319	Bath for Copper Strip Corrosion Test Bombs, 4-Unit, 220-240V 50/60Hz
K25320	Bath for Copper Strip Corrosion Test Bombs, 8-Unit, 115V 60Hz
K25329	Bath for Copper Strip Corrosion Test Bombs, 8-unit, 220-240V 50/60Hz
K25309	Optional Test Tube Rack for 8-Bomb Bath

Please refer to page 99 for photograph of K25310 Series Corrosion Baths.

K25330 Copper Strip Test Tube Bath

Test Tube Bath

Constant temperature bath immerses 17 test tubes for copper strip tarnish tests of products not requiring a test bomb, including: diesel fuel, fuel oil, automotive gasoline, Stoddard solvent, kerosene and lubricating oil. Microprocessor temperature controller has °C/°F switchable digital setpoint and display. Operator and equipment are protected by an overtemperature control circuit which automatically interrupts power to the unit should bath temperature exceed a programmed cut-off point. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Welded stainless steel inner wall and powder coated steel outer wall construction with built-in support rack. Fully insulated.

Specifications

Conforms to the specifications of: ASTM D130, D6074, D6158; FSPT DT-28-65; IP 154; ISO 2160; DIN 51759; FTM 791-5325; NF M 07-015
Capacity: 17 test tubes
Maximum Temperature: 190°C (374°F)
Temperature Control Stability: ±1°C (±2°F)
Heater Range: 0-750W
Bath Medium: 5 gal (18.9L) water or high temperature heater transfer fluid
Electrical Requirements: CE
115V 60Hz, Single Phase, 7.5A
220-240V 50/60Hz, Single Phase, 4A
Temperature Control: Digital

Dimensions: lxwxh,in.(cm)
15½x12½x14 (39x32x36)
Net Weight: 27 lbs (12.2kg)

Shipping Information

Shipping Weight: 45 lbs (20.4kg)
Dimensions: 12.8 Cu. ft.

Ordering Information

Catalog No.	
K25330	Copper Strip Test Tube Bath, 115V 60Hz
K25339	Copper Strip Test Tube Bath, 220-240V 50/60Hz
K25330-8B	Optional test Bomb Rack
K25330-4B-8T	Optional Rack, 4-Bomb, 8- Tube
K25330-6B-6T	Optional Rack, 6-Bomb, 6-Tube

Software compatible, inquire with Koehler Customer Service.

Copper Strip Corrosion Test Bomb

- For aviation fuels and natural gasoline

Precision machined stainless steel bomb inserts in copper corrosion bath for testing aviation fuels and natural gasoline. Withstands test pressure of 100psi (689kPa) per specifications. Threaded cap with O-ring gasket and knurled circumference tightens by hand to a positive seal. A ⅛" groove in the bomb threads permits safe, gradual release of pressure when opening the bomb.

Specifications

Conforms to the specifications of:
ASTM D130, D6074, D6158; IP 154; ISO 2160; DIN 51759; FTM 791-5325; NF M 07-015
Net Weight: 1 lb (.45kg)

Shipping Information:

Shipping Weight: 2 lbs (.91kg)

Ordering Information

Catalog No.	
K25200	Copper Strip Corrosion Test Bomb

Accessories

K25080	Copper Test Strip 12.5x1.5-3.0mm x 75mm to ASTM specifications
332-004-004	Test Tube 25 x 150mm
332-004-002	Viewing Test Tube Protects copper strip during inspection or storage
K25100	ASTM Copper Strip Corrosion Standards Colored reproductions of tarnished strips encased in a plastic plaque
380-220-001	Silicone Carbide Paper, FEPA Grade, 220 grit For polishing of copper strips prior to testing - Pack of 50 sheets
380-150-003	Silicone Carbide Grain, FEPA grade, 150 grit For final polishing of copper strips prior to testing - 1 lb package
K25000	Polishing Vise Holds copper strip firmly in place without marring the edges. Stainless steel, mounted on a composition base
K25090	Multi-Strip Polishing Vise Similar to K25000 but capable of holding four strips at a time
250-000-12F	ASTM 12F Thermometer. Range: –5 to +215°F
250-000-12C	ASTM 12C Thermometer. Range: –20 to +102°C

Silver Corrosion Test

Please refer to page 99 for information.

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Test Apparatus for Aviation Fuels and Natural Gasoline

Catalog No.		Order Qty
K25310	Bath for Copper Strip Corrosion Test Bombs, 115V	1
K25319	Bath for Copper Strip Corrosion Test Bombs, 220-240V	
K25200	Copper Strip Corrosion Test Bomb	4
K25080	Copper Strips	4
332-004-004	Test Tube	4
332-004-002	Viewing Test Tube	4
K25100	ASTM Copper Strip Corrosion Standard	1
380-220-001	Silicone Carbide Paper, FEPA Grade, 220 grit	1
380-150-003	Silicone Carbide Grain, FEPA grade, 150 grit	1
K25000	Polishing Vise	1
250-000-12F	ASTM 12F Thermometer	1
250-000-12C	ASTM 12C Thermometer	

Test Apparatus for Diesel Fuel, Fuel Oil, Automotive Gasoline, Stoddard Solvent, Kerosene, Lubricating Oil and Biodiesel

Catalog No.		Order Qty
K25330	Copper Strip Test Tube Bath, 115V (or K25339 Bath, 220-240V)	1
K25080	Copper Strips	17
332-004-004	Test Tube	17
332-004-002	Viewing Test Tube	17
K25100	ASTM Copper Strip Corrosion Standard	1
380-220-001	Silicone Carbide Paper, FEPA Grade, 220 grit	1
380-150-003	Silicone Carbide Grain, FEPA grade, 150 grit	1
K25090	Multi-Strip Polishing Vise	1
250-000-12F	ASTM 12F Thermometer	1
250-000-12C	ASTM 12C Thermometer	

K25200 Copper Strip Corrosion Bomb with K25100 and K25080

Vapor Pressure of Petroleum Products (Reid Method) and Liquefied Petroleum Gases (LPG Method)

Test Method

Vapor pressure is a critical factor in the handling and performance of liquid petroleum and liquefied petroleum gas (LPG) products. The vapor pressure of automotive gasolines is subject to governmental regulation for pollution control purposes.

Reid Vapor Pressure Cylinders

- Conform to ASTM D323, D1267 and related specifications
- One-opening and two-opening types

Polished stainless steel test cylinders for vapor pressure tests of liquid petroleum products, volatile crude oil and liquefied petroleum gas (LPG). Consists of upper chamber and lower chamber in required 4:1 volume ratio. O-ring gaskets provide tight seal between chambers and at gauge coupling. One-opening type is for gasoline and other products having a Reid Vapor Pressure below 26psi (180kPa). Two-opening type is for liquid products having a Reid Vapor Pressure above 26psi (ASTM D323) and for LPG (ASTM D1267). Lower chamber of two-opening apparatus includes straight-through ball valve and ¼" needle valve. For LPG testing, order two-opening type apparatus and accessory bleeder valve assembly.

Specifications:

Conforms to the specifications of: ASTM D323, D1267; GPA 2140; IP 69, 161; ISO 3007, 4256; DIN 51616, 51754; FTM 791-1201

Hydrostatic Test (two-opening type): Withstands 1000psi (6894kPa) gauge hydrostatic pressure per ASTM D1267 specifications

Included Accessories

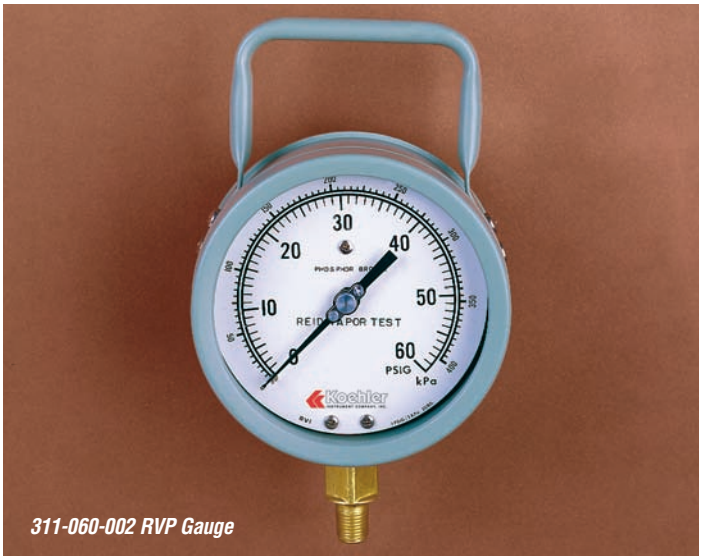
Threaded ⅛" Gauge Coupling
O-ring Seals (2)

Shipping Information

Shipping Weight: 7 lbs (3.2kg)

Ordering Information

Catalog No.	
K11500	Reid Vapor Pressure Cylinder, One-Opening Type
K11201	Reid Vapor Pressure Cylinder Two-Opening Type
K11202	Bleeder Valve Assembly for LPG tests for K11201 test cylinder



311-060-002 RVP Gauge

K11500 *K11201*

Reid Vapor Pressure Gauges

- Conforming to ASTM D323, D1267 and related specifications
- Dual psi/kPa scale on a 4½" diameter dial
- Accurate to within 0.5% of scale range
- Micrometer adjustable pointer

Ruggedly constructed Bourdon type gauge designed especially for the Reid Vapor Pressure test. Heavy duty rotary brushed stainless steel movement. Lightweight aluminum case with corrosion-resistant finish and heavy duty brass non-sparking handle. Includes blow-out disc and ¼" NPT male thread connection.

Ordering Information

Catalog No.	Range psi/kPa	Figure Intervals psi/kPa	Interval Graduations psi/kPa
311-005-004	0-5/35	0.5/5	0.05/0.2
311-015-002	0-15/100	1.0/10	0.1/1.0
311-030-002	0-30/200	5.0/20	0.5/2.0
311-060-002	0-60/400	5.0/50	0.2/2.5
311-100-002	0-100/700	10/50	0.5/2.5
311-250-001	0-250/1750	25/100	1.0/20
311-600-003	0-600/4200	50/250	2.0/25

Wireless Reid Vapor Pressure Data Acquisition System

Windows®-based electronic pressure measurement software designed for ASTM Reid Vapor Pressure test methods. Monitors up to eight pressure vessel channels, graphing pressure and RVP data in real-time for each channel. Each channel can be run independently and configured for the pressure ranges of 0-50, 0-200, and 0-1000 psi. Pressure values can be reported in psi or kPa. Software automatically exports results into Microsoft® Excel for data analysis and storage.

Ordering Information

Catalog No.		Order Qty
K11401	RVP Data Acquisition System, 115V 60 Hz	1
K11491	RVP Data Acquisition System, 230V 50/60 Hz *Includes software, multiplexer box, USB converter box and RTD temperature probe.* *Requires one pressure transducer for each pressure vessel.*	
K11404-50	RVP Pressure Transducer, 0-50 psi	1-8
K11404-200	RVP Pressure Transducer, 0-200 psi	1-8
K11404-1000	RVP Pressure Transducer, 0-1000 psi	1-8

Reid Vapor Pressure Data Acquisition System

4 Unit Reid Vapor Pressure Bath

- Conforms to ASTM D323, D1267 and related specifications
- Free standing or flush-mount benchtop installation
- Microprocessor programmable high accuracy temperature control

Constant temperature water baths designed for Reid Vapor Pressure determinations of liquid petroleum products and liquefied petroleum gases (LPG). Immerses vapor pressure apparatus at the proper depth per ASTM specifications. Controls bath temperature with ±0.2°F (±0.1°C) precision. Microprocessor PID control provides quick temperature stabilization without overshoot, and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. Double-wall construction with fiberglass insulated stainless steel tank. A sturdy 1" (25mm) flange permits flush-mount benchtop installation for easy access to the bath interior. Built-in holders suspend test cylinders at the required depth. Equipped with overflow stand pipe/drain.

Specifications

Conforms to the specifications of:
ASTM D323, D1267; GPA 2140; IP 69, 161; ISO 3007, 4256; DIN 51616, 51754; FTM 791-1201; NF M 07-007, 41-010
Capacity: 1 to 4 vapor pressure apparatus, one- or two-opening type
Temperature Control Stability: ±0.2°F (±0.1°C)
Maximum Temperature: 212°F (100°C)
Bath Medium: 13.7 gal (51.9L) water
Electrical Requirements: CE
115V 60Hz, Single Phase, 18.8A
220-240V 50/60Hz, Single Phase, 9.4A

Dimensions lxwxh,in.(cm)
15x15x36 (38.1x38.1x91.5)
Net Weight: 67 lbs (30.4kg)

Shipping Information
Shipping Weight: 105 lbs (47.7kg)
Dimensions: 14 Cu. ft.

Ordering Information

Catalog No.	
K11450	Reid Vapor Pressure Bath, 4-Unit, 115V 60Hz
K11459	Reid Vapor Pressure Bath, 4-Unit, 220-240V 50/60Hz

Photograph, thermometers, and additional accessories for Reid Vapor Pressure testing appear on page 94.

21-Unit Reid Vapor Pressure Bath

- Conforms to ASTM D323, 1267 and related specifications
- Digital electronic temperature control
- Automatic water level control maintains proper immersion depth

Constant temperature water bath immerses twenty-one test cylinders for vapor pressure tests on liquid products and liquefied petroleum gas (LPG). Electronic level control automatically maintains the proper immersion depth per ASTM specifications. Heating system employs a 6kW stainless steel heat exchanger with a heavy duty circulating pump to provide rapid heat-up, even heat distribution and ease of servicing. Convenient digital setpoint and display permits rapid selection of any bath liquid temperature within the operating range. A built-in overtemperature limit control protects against accidental overheating. Bath interior and internal components are constructed of heavy gauge stainless steel. Control panel is shielded by a hinged acrylic cover. Includes sturdy angle-iron base with corrosion resistant polyurethane finish. Order pressure gauges and cylinders separately.

Specifications

Conforms to the specifications of: ASTM D323, D1267; GPA 2140; IP 69, 161; ISO 3007, 4256; DIN 51616, 51754; FTM 791-1201
Testing Capacity: 21 vapor pressure test cylinders
Temperature Range: 212°F (100°C)
Temperature Control Stability: ±0.2°F (±0.1°C)
Heater Range: 0-6000W
Bath Medium: 58 gal (219.5L) water
Electrical Requirements: CE
220-240V 50Hz, Single Phase, 28A
220-240V 60Hz, Single Phase, 28A

Dimensions lxwxh,in.(cm)
Overall: 48x22x36 (122x56x91)

Ordering Information

Catalog No.	
K11415	Reid Vapor Pressure Bath, 21-Unit, 220-240V 50Hz
K11416	Reid Vapor Pressure Bath, 21-Unit, 220-240V 60Hz

Vapor Pressure of Petroleum Products and LP Gases

K11459 Reid Vapor Pressure Bath

Test apparatus for liquid products (ASTM D323) requires:
Test Cylinders, one or two-opening type
Pressure Gauges
Constant Temperature Bath
Bath Thermometer
Sample Container with Cover Assembly
Transfer Connection
Manometer
Manometer Adapter Kit

On-line version of this product is available. Please contact Koehler Customer Service for additional information.

Ordering Information

Catalog No.	
250-000-18F	ASTM 18F Thermometer Range: 94 to 108°F
250-000-18C	ASTM 18C Thermometer Range: 34 to 42°C
250-000-65F	ASTM 65F Thermometer Range: 122 to 176°F
250-000-65C	ASTM 65C Thermometer Range: 50 to 80°C
K11800	Sample Container with Cover Assembly
K11810	Transfer Connection Consists of threaded brass cap, delivery tube and sampling tube. Use for removing liquid from the sample container in accordance with ASTM specifications
371-000-002	Liquid Manometer Graduated in inches (0.1" div.). For checking pressure gauge reading of up to 15psi
K112B-1-0-12	Manometer Adapter Kit Kit for attaching pressure gauge to liquid manometer for pressure verification
AS568-210	O-ring Seal For coupling between air and gas chambers on K11500 and K11201 vapor pressure bombs
AS568-113	O-ring Seal For gauge and bleeder valve assembly connections on K11500 and K11201 vapor pressure bombs
K40100	Flexible Tubing Sulfur-free plastic lined tubing with ¼" stainless steel and aluminum connectors. For charging LPG test cylinder.

Test apparatus for liquefied petroleum gases (ASTM D1267) requires:
Test Cylinders, two-opening type
Bleeder Valve Assemblies
Pressure Gauges
Constant Temperature Bath
Bath Thermometer
Flexible Tubing
Manometer
Manometer Adapter Kit

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Wax Appearance Point of Distillate Fuels

Test Method

Detects the formation of wax crystals in burner fuels, diesel fuels and turbine engine fuels at low temperatures. The sample is cooled at a specified rate while being agitated. The temperature at which wax first appears is the wax appearance point.

Wax Appearance Point Apparatus

- Conforms to ASTM D3117 specifications

For detection of separated solids in burner fuels, diesel fuels and turbine engine fuels. Similar to K29700 Freezing Point Apparatus. Includes jacketed sample tube, motorized stirrer assembly, outer vacuum flask, clamps and stand.

Electrical Requirements: CE
115V 60Hz
220-240V 50Hz
220-240V 60Hz

Ordering Information

Catalog No.		Order Qty
K29760	Wax Appearance Point Apparatus, 115V 60Hz	1
K29768	Wax Appearance Point Apparatus, 220-240V 50Hz	
K29769	Wax Appearance Point Apparatus, 220-240V 60Hz	
250-000-06F	ASTM 6F Thermometer. Range: –112 to +70°F	1
250-000-06C	ASTM 6C Thermometer. Range: –80 to +20°C	

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Smoke Point of Kerosene and Aviation Turbine Fuel

Test Method

Smoke point is an indicator of the combustion qualities of aviation turbine fuels and kerosene. The fuel sample is burned in the Smoke Point Lamp, and the maximum flame height obtainable without smoking is measured.

Smoke Point Lamp

• Conforms to ASTM D1322 and related specifications

Burns fuel samples under controlled conditions for smoke point determinations of aviation turbine fuels and similar products. Consists of brass lamp body with chimney; gallery; 0-50mm black glass scale with white markings; brass plated door with curved glass window; candle socket; and plated brass candle with wick tube and air vent. Mounted on a cast iron base with aluminum support rod.

Ordering Information

Catalog No.		Order Qty
K27000	Smoke Point Lamp	1
	Accessories	
K27021	Extracted Cotton Wicks Prepared in accordance with ASTM D1322 (9.2) requirements. Packed in a sealed tube with desiccant. Case of 12	
K27020	Cotton Wicks, pack of 12	
K27050	Sighting Device Installs on chimney of Smoke Point Lamp. Eliminates parallax	1
K27060	Wick Insertion Tool Facilitates insertion of cotton wick into wick tube	1
K27065	Wick Trimmer Use together with K27060 Insertion Tool to place wick at the correct height in the wick tube, free of twists and frayed ends.	1
K27010	Interchangeable Candle	

Automatic Smoke Point Apparatus available. Inquire with Koehler Customer Service.

K27000 Smoke Point Apparatus with K27050 Sighting Device and K27060 Wick Insertion Tool

Specifications

Conforms to the specifications of:
ASTM D1322; ISO 3014; IP 57;
DIN 51406; FTM 791-2107; NF M 07-028

Included Accessories

Cotton Wicks, non-extracted (6)
Interchangeable Candle

Dimensions dia.xh,in.(cm)

7x18½ (18x47)
Net Weight: 10 lbs (4.5kg)

Shipping Information

Shipping Weight: 16 lbs (7.3kg)
Dimensions: 5 Cu. ft.

Freezing Point of Aviation Fuels

K29790 Freezing Point Bath with Freezing Point Apparatus and Stirrer

Ordering Information

Catalog No.		Order Qty
K29790	Refrigerated Freezing Point Bath 115V 60Hz, Single Phase, 18.3A	1
K29795	Refrigerated Freezing Point Bath 220-240V 50Hz, Single Phase, 10.0A	
K29796	Refrigerated Freezing Point Bath 220-240V 60Hz, Single Phase, 10.0A	
K29700	Freezing Point Apparatus, ASTM D2386	1
K29750-1-7	Stirrer Motor, 115V 60Hz	1
K29758-0-7	Stirrer Motor, 220-240V 50Hz	
K29759-1-7	Stirrer Motor, 220-240V 60Hz	
	Accessories	
250-000-114C	ASTM 114C Thermometer. Range: –80 to +20°C	1
K29720	Moistureproof Collar, Type A Use in place of brass packing gland to prevent condensation of moisture.	
K29721	Moistureproof Collar, Type B Use to prevent condensation.	

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Software compatible, inquire with Koehler Customer Service.

Test Method

The freezing point of an aviation fuel is the lowest temperature at which the fuel remains free of solid hydrocarbon crystals that can restrict the flow of fuel. The temperature of the fuel in the aircraft tank normally falls during flight depending upon aircraft speed, altitude, and flight duration. The freezing point of the fuel must be lower than the minimum operational tank temperature. The test determines the temperature below which solid hydrocarbon crystals form in aviation fuels. The sample is cooled with continuous stirring in a Dewar-type sample tube until crystals appear.

Refrigerated Freezing Point Bath

- Improved design with enhanced performance and safety features
- Operating range to –100°F (–73°C)
- Microprocessor PID digital temperature control
- Dual digital displays show setpoint and actual bath temperature
- Selectable temperature scale – Fahrenheit or Celsius
- Conforms to ASTM D2386 and related specifications

Redesigned constant temperature bath for freezing point determinations on fuel samples at temperatures as low as –100°F (–73°C). Accommodates K29700 Freezing Point Apparatus and accessory stirrer. Microprocessor PID circuitry provides precise, reliable temperature control within ASTM specified tolerances. Simple push button controls and dual digital displays permit easy setting and monitoring of bath temperature. Bath medium is contained in a clear, evacuated Dewar flask, and glare-free fluorescent backlighting provides excellent visibility when working with the freezing point samples. Air-cooled hermetic compressors provide efficient operation with the use of CFC-free refrigerants. Temperature control uniformity is assured by means of a motorized stirrer which provides complete circulation without turbulence. Cabinet construction is polyester-epoxy finished steel with a chemical-resistant composite top surface. Working (top) surface includes port and mounting plate for K29700 Freezing Point Apparatus and accessory stirrer. Bath rests on adjustable leveling feet.

Specifications

Conforms to the specifications of:
ASTM D2386; IP 16; ISO 3013; DIN 51421; FTM 791-1411; NF M 07-048
Temperature Range: Ambient to –100°F (–73°C)
Temperature Control Accuracy and Uniformity: Exceeds ASTM requirements throughout the operating range
Display: 0.1°C/°F resolution

Electrical Requirements: CE

115V, 60Hz, Single Phase, 18.3A
220-240V, 50Hz, Single Phase, 10.0A
220-240V, 60Hz, Single Phase, 10.0A

Dimensions lxwxh,in.(cm)

35x26x31 (89x66x78.75)
Net Weight: 259 lbs (117.75kg)

Shipping Information

Shipping Weight: 373 lbs (169.5kg)
Dimensions: 23¾ Cu. ft.

Automated Freezing Point of Aviation Fuels

Test Method

Determines the temperature below which solid hydrocarbon crystals may form in aviation turbine fuels and aviation gasoline. The freezing point of an aviation fuel is the lowest temperature at which the fuel remains free of solid hydrocarbon crystals that can restrict the flow of fuel through filters if present in the fuel system of the aircraft. The temperature of the fuel in the aircraft tank normally decreases during flight depending on aircraft speed, altitude, and flight duration. The freezing point of the fuel must always be lower than the minimum operational fuel temperature.

Automatic Freezing Point Analyzer with Integrated Panel PC

- Conforms to ASTM D1177, D1655, D2386, D5901, D5972 and related specifications
- Stand alone system with Integrated Touch Screen Panel PC
- Direct Cooling system eliminates the need for solvent cooling baths
- One-stage cooling system provides temperatures as low as -45°C and a two-stage cooling system down to -80°C
- Freezing Point measured by light pulsed emission on I.R spectrum through a coaxial fiber optic with mirror

The freezing point detection system provides automated sample testing with the accuracy and repeatability in accordance with ASTM D1177, D1655, D2386, D5901, D5972 and related international specification. The sample is cooled in the test chamber with constant stirring. The sophisticated dynamic measurement system emits a light pulse every 0.5°C from a coaxial fiber optic cable positioned above the test sample. The light pulse is then reflected off the mirror of the fiber optic to an optical sensor. The advanced software package analyzes the response of the light pulse. The initial appearance of crystallization is monitored by light scattering. The sample is then warmed up, and the temperature at which the hydrocarbon crystals disappear is recorded as the freezing point. All clear and transparent fuels are readily measured by the detection system, regardless of sample color.

Integrated Panel PC and Software Package–The Automated Freezing Point Analyzer is a complete standalone system featuring an integrated panel PC with an advanced software package. The 6.4" TFT/LCD touch screen display has a resolution of 640x480 with a 262K color scheme. All analytical parameters are graphed and displayed in real time as well as recorded in Microsoft® Excel compatible file format. The software monitors the operation and performance of all the analyzer components for proper data measurement, including the solenoid valves, cooling system, pressure sensors, and the Platinum resistance PT100 Class A temperature probe.

Cooling System–For various user applications, the automated freezing point system is available with either one-stage cooling for temperatures as low as -45°C or two-stage cooling for temperatures as low as -80°C. The direct cooling system features integrated gas CFC free motors compressors thus eliminating the need for a solvent cooling bath. The direct system is capable of rapid cooling, approaching -80°C bath temperatures in approximately 15 minutes, and utilizes less electricity than standard cooling systems. The rapid cooling feature combined with a consistent cooling profile system provides repeatable results with high test reproducibility.

Safety Features

- Audible alarm and displayed messages (at the end of the analysis and in case of errors and/or malfunctions)
- Pressure controller for 1st and 2nd stage motor compressor
- Thermostat for 2nd stage activation
- Thermo-switch for each cooling / heating jacket
- Motor compressors equipped with internal overload devices

KLA-5-TS Automatic Freezing Point Analyzer with integrated touch screen PC

Multiple Configuration System–These automated sample cooling and physical property measurement systems can be configured with one, two, three, four and six test positions with one of five possible analytical heads at each position: cloud point, pour point, cloud & pour point, cold filter plugging point and freezing point. Standard and customized multiple configuration systems are readily available.

Specifications

Conforms to the specifications of:
ASTM D1177, D1655, D2386, D5901 (Withdrawn 2010); IP 16; ISO 3013
Temperature Range:
One-Stage: +30 to -45°C
Two-Stage: +30 to -80°C
Resolution: 0.06°C
Accuracy: ±0.1°C
Repeatability / Reproducibility: as per standard test methods or better
Data Storage: > 60,000 analyses
Electrical Requirements: CE
115V ± 15% / 60Hz
220V ± 15% / 50 to 60Hz

Dimensions WxDxH,in.(cm)
26 x 23¾x 31½ (66x60x80)
Net Weight: 176.5 lbs (80kg)

Ordering Information

Catalog No.	
KLA-5-TS	Automatic Freezing Point Analyzer with Touch Screen, (One-stage)
KLA-5-TS/2	Automatic Freezing Point Analyzer with Touch Screen, (Two-stage)

Please specify voltage requirements when ordering.

Accessories

KLA-PT100-CAL	Certified Calibration Decade Box - PT100 Simulator
KLA-DB-KIT	Set of Connectors and Cables

Extended Cooling Range down to -100˚C Available Upon Request.

Koehler INSTRUMENT COMPANY, INC.

Antirust Properties of Petroleum Products Pipeline Cargoes

K30160NACE Rust Preventing Characteristics Bath

Specifications

Conforms to the specifications of:
NACE TM-01-72; ASTM D665*, D6158, D3603*;
IP 135; ISO 7120; DIN 51585; FTM 791-4011; NF T 60-151
Testing Capacity: Six (6) 400mL sample beakers
Maximum Temperature: 104°C (220°F)
Temperature Control Stability: ±0.5°C (±1°F)
Heater Range: 0-1500W
Drive Motor: explosion proof ball bearing type
Bath Medium: 11 gal (41.6L) white technical oil
Electrical Requirements: CE
115V 60Hz, Single Phase,13.0A
220-240V 50Hz, Single Phase, 6.8A
220-240V 60Hz, Single Phase, 6.8A

Included Accessories

Steel Test Specimens (6)
Type 2 Plastic Specimen Holders (6)
Plastic Beaker Covers (6)

Dimensions lxwxh,in.(cm)

32¾x14¼x27 (83x36x69)
Net Weight: 79 lbs (35.8kg)

Shipping Information

Shipping Weight: 150 lbs (68.0kg)
Dimensions: 16.2 Cu. ft.

This equipment has been modified for safe operation when testing volatile petroleum products in accordance with NACE Standard Test Method TM-01-72.

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Software compatible, inquire with Koehler Customer Service.

Test Method

Used to control corrosion in product pipelines caused by moisture condensed from gasoline and distillate fuels. Antirust properties are determined by immersing a polished steel test specimen in a stirred mixture of the sample and distilled water held at constant temperature.

Rust Preventing Characteristics Oil Bath

- Conforms to NACE TM-01-72, ASTM D665* and D3603* specifications
- Accommodates six sample beakers
- Microprocessor temperature control with digital display and overtemperature protection

Six-place constant temperature bath with stirrers for rust preventing characteristics tests. Stirs sample-water mixtures at 1000rpm and controls temperature with ±0.5°C (±1°F) stability. Immerses test beakers at the proper depth per NACE specifications. Microprocessor temperature control has °C/°F switchable digital setpoint and display. Operator and equipment are protected by an overtemperature control circuit which automatically interrupts power to the unit should bath temperature exceed a programmed cut-off point. Stainless steel stirrer paddles are driven at 1000rpm by an improved pulley drive-roller bearing arrangement. Paddles move to a raised position for placement of sample beakers in the bath. Stainless steel bath includes perforated support shelf for beakers and cover plate. Long lasting polyester drive belt improves reliability. Drive train components are protected by a removable steel guard. All exterior surfaces have stainless steel or chemical resistant polyurethane enamel finishes.

**To order this equipment for ASTM and equivalent test methods, please turn to page 128.*

Ordering Information

Catalog No.		Order Qty
Rust Preventing Characteristics Oil Bath		1
K30160NACE	Rust Preventing Characteristics Oil Bath, 115V 60Hz	
K30165NACE	Rust Preventing Characteristics Oil Bath, 220-240V 50Hz	
K30166NACE	Rust Preventing Characteristics Oil Bath, 220-240V 60Hz	
Accessories		
332-002-007	Test Beaker, 400mL, for NACE TM-01-72	6
250-000-09F	ASTM 9F Thermometer Range: 20 to 230°F	7
250-000-09C	ASTM 9C Thermometer Range: –5 to +110°C	
K30130	Chuck for polishing test specimens Includes locknut and shaft for mounting on accessory drive motor	1
K30150	Drive Motor Drives K30130 Chuck. Mounted on base. 115V 60Hz	1
380-100-001	Silicone Carbide Cloth, 100 grit For preliminary grinding and final polishing of test specimens. Pack of 50	1
Test Specimens		
K30110	Steel Test Specimens for ASTM D665/ NACE TM-01-72. Machined to ASTM/NACE specifications. Without holder	
K30100	Test Specimen with Type 2 PMMA Holder for ASTM D665/NACE TM-01-72	
K30101	Test Specimen with Type 2 PTFE Holder	

Silver Corrosion of Aviation Turbine Fuels

Test Method

Tests the corrosiveness of aviation turbine fuels towards silver. A polished silver strip is immersed in a fuel sample at elevated temperature. After a specified test period, the strip is removed from the sample, washed and evaluated for corrosion.

Water Bath for Silver Corrosion

- Conforms to IP 227 specifications
- Six sample capability

Fully insulated, thermostatically controlled water bath with constant water level device. Use together with K25370 Bath Conversion Kit to immerse six 350mL test tubes for silver strip corrosion tests. Stainless steel inner wall and powder coated steel outer wall construction.

Ordering Information

Catalog No.		Order Qty
K25310	Water Bath, 115V 60Hz	1
K25319	Water Bath, 220-240V 50/60Hz	
K25370	Bath Conversion Kit for IP 227	1
	Accessories	
K25360	Glassware Set for IP 227 Includes cold-finger condenser, glass cradle and 350mL test tube	6
K25280	Silver Test Strip Conforming to IP 227 specifications	6
K25282	ASTM D3241-IP 323 Color Standard	1
250-000-12C	ASTM 12C Thermometer Range: –20 to +102°C	
K25000	Polishing Vise Holds silver strip firmly in place without marring the edges. Stainless steel, mounted on a composition base	1
380-240-001	Silicone Carbide Paper, 240-grit For final polishing of strips prior to testing. Pack of 50 sheets	1
380-150-001	Silicone Carbide Paper, 150-grit For polishing strips prior to testing. Pack of 50 sheets	1
380-150-000	Silicone Carbide Grain, 150-grit For polishing ends and sides of strips prior to testing. 1 lb package	1
	Additional Accessories for D4814	
K25200	Copper Strip Corrosion Test Bomb	4
332-004-004	Test Tube	4

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

K25310 Constant Temperature Bath

Specifications

Conforms to the specifications of:
IP 227; ASTM D130, D4814, D6074, D6158; FSPT DT-28-65; IP 154; ISO 2160; DIN 51759; FTM 791-5325
Testing Capacity: 6 samples for silver strip corrosion testing
Maximum Temperature: 221°F (105°C)
Temperature Control Stability: ±1°F (±0.5°C)
Heater Range: 0-750W
Bath Medium: 5 gal (18.9L) water
Electrical Requirements: CE
115V 60Hz, Single Phase, 7.5A
220-240V 50/60Hz, Single Phase, 4A
Temperature Control: Analog

Shipping Information

Shipping Weight: 29 lbs (13.2kg)
Dimensions: 5.3 Cu. ft.

Cold Filter Plugging Point of Distillate Fuels

K45950 Cold Filter Plugging Point Bath

Ordering Information

Catalog No.		Order Qty
Cold Filter Plugging Point Apparatus		1
K45900	Cold Filter Plugging Point Apparatus	
Vacuum System		
K45920	Vacuum System	1
Cooling Bath		
K45950	Mechanically Refrigerated Cold Filter Plugging Point Bath, 115V 60Hz	1
K45995	Mechanically Refrigerated Cold Filter Plugging Point Bath, 220-240V 50Hz	
K45910	Cooling Bath (Dry Ice Model)	
	Accessories	
250-000-05C	ASTM 5C Thermometer Range: –38 to +50°C	1
250-000-06C	ASTM 6C Thermometer Range: –80 to +20°C	

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Software compatible, inquire with Koehler Customer Service.

Test Method

Determines the low temperature flow characteristics of automotive diesel fuels and gas oils, including samples with flow improving additives, by measuring the temperature at which the sample ceases to flow through a wire mesh filter under standard test conditions.

Cold Filter Plugging Point Test Equipment

- Conforms to ASTM D6371, IP 309 and DIN 51428 specifications
- Choice of mechanically refrigerated or dry ice cooled bath

Consists of Cold Filter Plugging Point Apparatus, Vacuum System and Cooling Bath.

Cold Filter Plugging Point Apparatus–Includes borosilicate glass test jar with graduation, brass jacket with plastic support ring, plastic stopper, plastic insulating ring and spacer, pipette and brass filter unit with stainless steel fine wire mesh screen.

Vacuum System–Connects to Cold Filter Plugging Point Apparatus to draw sample through filter screen. Consists of U-tube Manometer (without mercury), three-way stopcock, air vent tube, cork stopper with elbows, and large glass bottle. Vacuum pump is not included.

Cooling Baths–Choice of mechanically refrigerated or dry-ice cooled baths. Mechanically refrigerated model utilizes a cascade hermetic cooling system to attain temperatures as low as –90°F (–68°C). Cold Filter Plugging Point Apparatus inserts in composition top plate of bath. Insulated stainless steel tank and polished stainless steel cabinet.

Dry-ice model includes insulated copper interior and steel exterior with corrosion resistant polyurethane enamel finish. Composition top plate suspends Cold Filter Plugging Point Apparatus in freezing mixture at the required depth. Handles on exterior permit easy emptying of freezing mixture. Supplied with thermometer holder.

Specifications

Conforms to the specifications of:
ASTM D6371; IP 309; DIN 51428
Electrical Requirements: CE
Mechanically Refrigerated Baths
115V 60Hz, Single Phase, 6A
220-240V 50Hz, Single Phase, 3A

Dimensions*in.(cm):

Refrigerated Model (lxwxh):
35x26x31 (89x66x78.75)
Net Weight: 259 lbs (117.75kg)
Dry-Ice Model (dia.xh):
12x12 (30x30)
*Cooling Bath

Shipping Information

Shipping Weight:
Refrigerated Model: 373 lbs (169.5kg)
Dry-Ice Model: 19 lbs (8.6kg)
Dimensions:
Refrigerated Model: 23¾ Cu. ft.
Dry-Ice Model: 3 Cu. ft.

Automated Cold Filter Plugging Point of Distillate Fuels

Test Method

Determines the highest temperature at which a given volume of diesel, biodiesel or heating fuel fails to pass through a standardized wire mesh filtration device in a specified time when cooled under specified conditions. The Cold Filter Plugging Point (CFPP) of a fuel is suitable for estimating the lowest temperature at which a fuel will give trouble-free flow in certain fuel systems.

Automatic Cold Filter Plugging Point Analyzer with Integrated Panel PC

- Conforms to ASTM D6371 and related specifications
- Stand alone system with Integrated Touch Screen Panel PC
- Direct Cooling system eliminates the need for solvent cooling baths
- One-stage cooling system provides temperatures as low as -45°C and a two-stage cooling system down to -80°C
- Option of internal or external vacuum generation system

The cold filter plugging point detection system provides automated sample testing with the accuracy and repeatability in accordance with ASTM D6371 and related international test methods. The sample is cooled according to the pre-selected temperature profile. A 20 mBar vacuum is applied to the sample at specific intervals across a 45 micron mesh filter into the aspiration glass cell assembly. If it takes more than 60 seconds for the sample to reach the upper barrier detector or more than 60 seconds to return below the detector upon release, then the test is complete and the cold filter plugging point has been reached.

Integrated Panel PC and Software Package–The Automated Cold Filter Plugging Point Analyzer is a complete standalone system featuring an integrated panel PC with an advanced software package. The 6.4" TFT/LCD touch screen display has a resolution of 640x480 with a 262K color scheme. All analytical parameters are graphed and displayed in real time as well as recorded in Microsoft® Excel compatible file format. The software monitors the operation and performance of all the analyzer components for proper data measurement, including the solenoid valves, cooling system, pressure sensors, and the Platinum resistance PT100 Class A temperature probe.

Cooling System–For various user applications, the automated cold filter plugging point system is available with either one-stage cooling for temperatures as low as -45°C or two-stage cooling for temperatures as low as -80°C. The direct cooling system features integrated gas CFC free motors compressors thus eliminating the need for a solvent cooling bath. The direct system is capable of rapid cooling, approaching -80°C bath temperatures in approximately 15 minutes, and utilizes less electricity than standard cooling systems. The rapid cooling feature combined with a consistent cooling profile system provides repeatable results with high test reproducibility.

Vacuum System–The automated cold filter plugging point analyzer can be configured with either an internal or external vacuum generator. The internal vacuum generator provides a smaller footprint for the complete CFPP system and consists of a 350 mBar micro-pump and an electronic pressure/vacuum regulator composed of a proportional valve, pressure/vacuum control sensor, regulator for reference vacuum generation at 20 mBar and a vacuum stabilizer. The external vacuum generator includes a vacuum pump, two glass bottles and a glass cork with a U-tube, funnel and manual flow regulating valve.

Multiple Configuration System–These automated sample cooling and physical property measurement systems can be configured with one, two, three, four and six test positions with one of five possible analytical heads at each position: cloud point, pour point, cloud & pour point, cold filter plugging point and freezing point. Standard and customized multiple configuration systems are readily available.

KLA-4-TS Automatic CFPP Analyzer with Integrated Touch Screen PC

Specifications

Conforms to the specifications of: ASTM D6371; IP 309, 419; EN 116
Temperature Range: One-Stage: +60 to -45°C Two-Stage: +60 to -80°C
Resolution: 0.06°C Accuracy: ±0.1°C
Repeatability / Reproducibility: as per standard test methods or better
Data Storage: > 60,000 analyses
Electrical Requirements: 115V ± 15% / 60Hz 220V ± 15% / 50 to 60Hz CE

Dimensions WxDxH,in.(cm)

26 x 23¾x 31½(66x60x80) Net Weight: 176.5 lbs (80kg)

Included Accessories

Calibrated Aspiration Pipette complete with Filter Kit for CFPP

Cord Cable without plug	Calibrated Test Jar	User Manual
Connection Tube for Vacuum System	Operating Software	Spacer

Safety Features

- Audible alarm and displayed messages (at the end of the analysis and in case of errors and/or malfunctions)
- Pressure controller for 1st and 2nd stage motor compressor
- Thermostat for 2nd stage activation
- Thermo-switch for each cooling / heating jacket
- Motor compressors equipped with internal overload devices

Ordering Information

Catalog No.	
KLA-4-TS	Automatic Cold Filter Plugging Point Analyzer with Touch Screen, (One-stage)
KLA-4-TS/2	Automatic Cold Filter Plugging Point Analyzer with Touch Screen, (Two-stage)
KLA-4-IVPS	Internal Vacuum System for Cold Filter Plugging Point Analyzer
KLA-4-VPS(115)	External Vacuum System for Cold Filter Plugging Point, 115V
KLA-4-VPS(220)	External Vacuum System for Cold Filter Plugging Point, 220V

Please specify voltage requirements when ordering.

Accessories

KLA-PT100-CAL	Calibration Decade Box - PT100 Simulator
KLA-DB-KIT	Set of Connectors and Cables

Extended Cooling Range down to -100˚C Available Upon Request.

Koehler INSTRUMENT COMPANY, INC.

Octane Analyzer For Unleaded Gasolines

Test Method

Determines the Pump Octane Number (AKI), Research Octane Number (RON), and Motor Octane Number (MON) of unleaded gasoline, ethanol blended gasoline, leaded gasoline and Cetane Number for diesel fuels.

Portable Octane Analyzer

- Test results equivalent to ASTM D2699 and D2700 test methods
- Measures all grades of unleaded gasoline and ethanol blended gasoline
- Test results equivalent to ASTM D613 for Cetane Number of diesel fuels (Optional with K88612)
- Displays results in 20 seconds
- Directly measures octane number for {(R+M)}/2, RON and MON
- Optional feature for cetane number determination of diesel fuels
- Includes RS-232 output, built-in printer and LCD display
- Results traceable to official knock engine laboratory
- GPS model available for use with GPS locator accessory

Measures octane number via near-infrared (NIR) transmission spectroscopy utilizing 14 near-infrared emitting diodes with narrow bandpass filters, a silicon detector system, and a fully integrated microprocessor. Simple octane number determination requires three easy steps: sampling a background signal, acquiring two absorption spectra of the gas sample, and then acquiring a second background signal. Analyzer is pre-calibrated for unleaded gasoline and ethanol-blended fuels, and can be calibrated for up to eight additional fuel types.

The analyzer is small, lightweight, and operates on "AA" batteries or AC. Before each reading, the unit standardizes itself to assure accuracy. The octane number is printed with time and date on the built-in printer. All data can be downloaded via the RS232 port to an external computer.

Specifications

Accuracy and repeatability equivalent to ASTM approved CFR engines test methods (ASTM D2699, D2700)
Sample Holder: Sealed, cubical glass container (75mm optical path length)
Sample Volume: 8 Ounces (approx. 225 mL)
Operating Temperature Range: 7°C - 38°C
Pre-calibrated for unleaded & ethanol-blended gasoline
(Analyzer can be calibrated for up to 8 additional fuel types.)
Battery operated (6 AA batteries)
Electrical Requirements: CE
115/240V 50/60Hz

Safety Features

Out of Temperature Range Warning: Analyzer displays Out of Range Warning Message when instrument in being used outside of its standard operating temperature range. Either above 38°C or below 7°C.

Out of Calibration Range Warning: Analyzer displays “Too High” or “Too Low” message when measurement reading is out of the instruments calibration range.

Bad Curve Warning: Analyzer warns user when light protective lid is not on during testing. External light source will greatly disrupt results.

Included Accessories

Calibration Software
Aluminum Carrying Case
Sample Holder (3)
AA Battery (6)
RS232 Cable
Printer Paper Roll (5)
Light Cover
Sample Holder Label (6)

K88600 Portable Octane Analyzer

Dimensions wxdxh,in.(cm)
13½x4½x2½ (34x11½x6¼)
Net Weight: 12 lbs (5.5kg)

Shipping Information
23x17x8½ (58½x43¼x22)
Shipping weight: 25 lbs (11.5kg)

Ordering Information

Catalog No.	
K88600	Portable Octane Analyzer
K88600-GPS	Portable Octane Analyzer GPS Model Requires GPS Locator Feature (K88613)

Accessories

K88601	Printer Paper, 10 Rolls
K88603	Sample Holder (additional)
K88604	Sample Holder (Box of 12)
K88605	Light Shield
K88606	RS232 Cable
K88607	Aluminum Sample Carrying Case w/12 Sample Holders
K88608	Sample Holder Lids, Quantity 12
K88609	Sample Holder Labels, Quantity 12
K88610	25 Sample Memory

Optional Features

K88612	Cetane Number Calibration
K88602	Additional Fuel Calibration
K88613	GPS Locator (for K88600-GPS model only)

Density/Relative Density of Light Hydrocarbons by Pressure Thermohydrometer

Test Method

Density and relative density measurements of light hydrocarbons, including LPG, are used for transportation, storage and regulatory purposes. The measurement is made by floating a thermohydrometer in a sample that has been introduced into a pressure cylinder.

Pressure Hydrometer Cylinder

- Conforms to ASTM D1657 and related specifications
- Built-in safety relief valve

Transparent plastic cylinder mounted between machined aluminum end plates and surrounded by stainless steel safety guard. Use together with ASTM 310H Thermohydrometer to determine density or relative density of LPG and light hydrocarbons. Equipped with inlet, outlet and vapor vent valves for admitting sample and purging cylinder. End plates have positive sealing buna-N O-rings and are joined by sturdy steel support rods. Top plate detaches easily without tools for insertion or removal of thermohydrometer. Safety relief valve prevents unsafe pressure build-up inside cylinder. Mounted on a finished steel base.

Specifications

Conforms to the specifications of:
ASTM D1657; GPA 2140;
IP 235; IS0 3993; NF M 41-008
Safety relief valve: 200psi (1.4MPa)

Dimensions dia.xh,in.(cm)

8¼x23¾ (21x60)
Net Weight: 5 lbs (2.3kg)

Ordering Information

Catalog No.	
K26150	Pressure Hydrometer Cylinder
	Accessories
251-000-001	ASTM 101H Thermohydrometer Nominal Relative Density Range: 0.500 to 0.650 Standard Temperature, °F: 60/60 Temperature Range, °F: 30 to 90
251-000-004	ASTM 310H Thermohydrometer Density Range kg/m^3: 500-650 Standard Temperature, °C: 15 Temperature Range, °C: 0 to 35

K26150 Pressure Hydrometer Cylinder

Constant Temperature Water Bath

- Conforms to ASTM D1657 and related specifications
- Mechanically refrigerated for convenient sub-ambient temperature operation

Immerses two Pressure Hydrometer Cylinders at 60°F (15°C) for density and relative density determinations of LPG and other light hydrocarbons. Mechanically refrigerated cooling system maintains sub-ambient temperature. Thermistor activated solid state temperature controller and 750W copper immersion heater maintain bath temperature with ±0.5°F (±0.2°C) stability. A 1/20 hp ball bearing stirrer circulates the bath medium to assure temperature uniformity. Stainless steel tank is fiberglass insulated. Equipped with overflow standpipe/drain. Steel exterior has a durable polyurethane enamel finish.

Specifications

Conforms to the specifications of: ASTM D1657; IP 235; ISO 3993
Controller Sensitivity: ±0.5°F (±0.2°C)
Capacity: two (2) K26150 cylinders
Electrical Requirements: CE
115V 60Hz, Single Phase, 12.5A
220-240V 50 or 60Hz, Single Phase, 6.4A

Dimensions lxwxh,in.(cm)

Bath interior: 12x18x22(30x46x56)
Overall: 18x20x49 (46x51x124)
Net Weight: 158 lbs (71.7kg)

Shipping Information

Shipping Weight: 186 lbs (84.4kg)
Dimensions: 15.4 Cu. ft.

Ordering Information

Catalog No.	
K25900	Constant Temperature Water Bath, 115V 60Hz
K25990	Constant Temperature Water Bath, 220-240V 60Hz
K25995	Constant Temperature Water Bath, 220-240V 50Hz
	Accessories
250-000-12F	ASTM 12F Thermometer. Range –5 to +215°F
250-000-12C	ASTM 12C Thermometer. Range –20 to +102°C

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Koehler INSTRUMENT COMPANY, INC.

K41506 Fluorescent Indicator Absorption Apparatus

Specifications

Conforms to the specifications of:
ASTM D1319; IP 156; NF M 07-024
Electrical Requirements: CE
115V 60Hz
220-240V 50/60Hz

Included Accessories

Syringe, 1mL	Ball-and-Socket Joint Clamps
Bottles (2)	Mounting Brackets (2)
O-Rings	Integrated Electric Vibration
	Handheld UV Lamp

Dimensions lxwxh,in. (cm)
8x26x82 (20x66x208)
Net Weight: 100 lbs (45.5kg)

Shipping Information

Shipping Weight: 121 lbs (55kg)
Dimensions: 12 Cu. ft.

Test Method

Determines saturates, olefins and aromatics in petroleum fractions that distill below 315˚C.

Fluorescent Indicator Absorption Apparatus

- Conforms to ASTM D1319 specifications
- Quick connections for columns for faster set-up and analysis
- Integrated vibration system for dry silica gel packing
- Handheld UV Lamp
- Two, four, or six column models available

A complete system for conducting FIA analyses of a single or up to six samples simultaneously. Each system is complete with an upper multi-position air pressure manifold with independently-operated gauges, pressure regulators and ball O-ring joints allowing for individual pressure control at each column. Each pressure regulator may be set at any point from 0-15 psi and will maintain the set pressure regardless of changes in back pressure. An integral pressure gauge on each station continuously registers the active pressure on each column. The ball O-ring connection system connects the pressure regulators to the upper columns, and the proper seal is achieved by applying moderate clamping pressure of stainless steel clamps without utilizing any grease. Convenient O-ring compression type fittings simplify the connection of the analyzer tubes (3mm OD x 1200mm) to the upper columns. The internal geometry of the fittings is optimized for transition between tubing diameters, and a simple twist of the connection fitting releases the analyzer tube. O-ring compression type fittings are also used to cap the end of each analyzer tube with the column support tips. The tips contain an internal porous polyethylene disc in order to support the silica gel packing in each analyzer tube. An integrated electric vibration system is mounted to the upper chassis so that the columns can be vibrated to facilitate the dry gel packing procedure, and features an on/off and amplitude selector switch. The complete unit also includes a 1mL syringe with 4" needle, two gel bottles for pouring silica gel, extra O-rings, stainless steel ball-and-socket joint clamps, and two mounting brackets with screws for stabilizing chassis.

Ordering Information

Catalog No.	
K41502	Fluorescent Indicator Absorption Apparatus, Two-Position, 115V 60Hz
K41592	Fluorescent Indicator Absorption Apparatus, Two-Position, 230V 50/60Hz
K41504	Fluorescent Indicator Absorption Apparatus, Four-Position, 115V 60Hz
K41594	Fluorescent Indicator Absorption Apparatus, Four-Position, 230V 50/60Hz
K41506	Fluorescent Indicator Absorption Apparatus, Six-Position, 115V 60Hz
K41596	Fluorescent Indicator Absorption Apparatus, Six-Position, 230V 50/60Hz

Accessories

K41500-4	Silica Gel, 500 Gram Amber Bottle
K41500-5	Silica Gel, Dyed, 40 Gram Bottle
K41579	Standup UV Lamp, 115V 60Hz
K41580	Standup UV Lamp, 230V 50/60Hz

Volatility and Residues in Liquefied Petroleum (LP) Gases

Volatility of Liquefied Petroleum (LP) Gases
Residues in Liquefied Petroleum (LP) Gases

Test Method

The volatility of liquefied petroleum (LP) gases is determined by allowing a precooled sample to weather under specified conditions and observing the temperature when 95% has evaporated. Residues in LP gases are determined by weathering of a precooled sample and determination of the volume remaining at 100°F (37.8°C).

Precooling Apparatus

- Conforms to ASTM and GPA specifications

Consists of brass cooling vessel with built-in 20 ft. (6m) copper cooling coil. Includes compression fittings and ⅛" needle valve at the downstream end.

Specifications

Conforms to the specifications of: ASTM D1837; D2158; GPA 2140; ISO 13757

Dimensions: *dia.xh,in.(cm) 3x11¼ (7.6x29.9)
*Cooling Vessel

Ordering Information

Catalog No.	
K48100	Precooling Apparatus
	Accessories
332-010-001	Weathering Tube, 100mL
339-000-001	Stand, for weathering tube
337-000-002	Clamp, for weathering tube
338-000-001	Clamp Holder
362-001-001	Syringe, 1mL (ASTM D2158)
K481-0-5	Needle, 8"/203mm (ASTM D2158)
250-000-99F	ASTM 99F Thermometer, Range: –55 to +41°F
250-000-99C	ASTM 99C Thermometer, Range: -50 to +5°C
250-000-05F	ASTM 5F Thermometer, Range: –36 to +120°F
250-000-05C	ASTM 5C Thermometer, Range: –38 to +50°C
250-000-57F	ASTM 57F Thermometer, Range: –4 to +122°F
250-000-57C	ASTM 57C Thermometer, Range: –20 to +50°C

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Filterability of Diesel Fuels by Low-Temperature Flow Test

Test Method

Determines the filterability of Diesel fuels and Biodiesel blend fuels in some automotive equipment at low temperatures. The Low Temperature Flow Test results are indicative of the low temperature flow performance of the test fuel in some diesel vehicles. The test method is especially useful for the evaluation of fuels containing flow improver additives in a range of +10°C to -30°C.

Automatic Low Temperature Filterability Test Analyzer (LTFT)

Up to (6) 300 ml test vessels are cooled at a specified rate of 1°C/h, and at every °C of cooling, a vacuum of 20 kPa is applied to a filter assembly immersed in the first sample. If the sample recovered in a graduated receiver vessel reaches the 180 ml in 60 sec., the analysis continues to the further 1°C test temperature (passed). When the sample doesn't reach the 180 ml within the 60 sec., the test is failed. The temperature of the last passing result test has to be recorded as minimum LTFT pass temperature.

The instrument is a six place floor model, equipped with a built in cooling system with a single stage CFC free motor compressor for temperatures as low as -45°C. Integrated Vacuum System consisting of a 350 kPa micropump, vacuum stabilizer and electronic control for vacuum regulation of 20 kPa. Fully automatic, controlled by an integrated panel pc with touch screen and a large display. All the parameters and the current status of the analysis are shown in real time.

KLA-7 LTFT

Specifications

Conforms to the Specifications of: ASTM D4539
Temperature Range: +80°C to -80°C
Resolution: 0.06°C
Accuracy: ±0.1°C
Repeatability / Reproducibility: Meets or exceeds ASTM specifications
Storage Capacity: Up to 60,000 analyses
Interface: USB Port (2)
Electrical Requirements: CE
115V ±15%, 60Hz
220V ±15%, 50/60Hz

Dimensions: wxdxh,in.(cm)
38½ x 23½ x 51¼ (98x60x130)
Net Weight: 176.5 lbs (80kg)

Ordering Information

Catalog No.	
KLA-7	Automatic Low Temperature Filterability Test Analyzer (LTFT), 115V 60Hz
KLA-7 (220)	Automatic Low Temperature Filterability Test Analyzer (LTFT), 220V 50/60Hz
	Accessories
KLA-PT100-CAL	Calibration Box and Cables
KLA-DB-KIT	Kit of Connectors and Cables for Cold range

Koehler INSTRUMENT COMPANY, INC.

Additional Accessories

Additional equipment, materials and/or reagents are required to perform some of the test procedures in the preceding pages. Please refer to the applicable test method for further information, or contact Koehler for assistance.

Oxidation Stability of Gasoline (Induction Period Method) ..... Pages 80-84

ASTM D525; IP 40; DIN 51780; FTM 791-3352

Corrosion Resistant Steel Forceps
Oven
Distilled Water
Chromic Acid or equivalent detergent cleaning solution
Toluene
Acetone
Oxygen

Oxidation Stability of Aviation Fuels (Potential Residue Method) ..... Pages 80-84

ASTM D873; IP 138; DIN 51799; FTM 791-3354

Corrosion Resistant Steel Forceps
Drying Oven
Filtering Crucible
Oxygen
Toluene
Distilled Water
Acetone

Existent Gum in Fuels by Jet Evaporation ..... Page 86-87

ASTM D381; IP 131; ISO 6246; DIN 51784; FTM 791-3302

Analytical Balance
Desiccator
Filtering Funnel, Sintered Glass
n-Heptane
Air Supply (for Air-Intake Method)
Toluene
Acetone
Graduated Cylinder
Chromic Acid or equivalent detergent cleaning solution
Distilled Water
Oven

Copper Strip Corrosion by Liquefied Petroleum (LP) Gases ..... Page 89

ASTM D1838; GPA 2140; ISO 6251

Acetone
2,2,4-Trimethylpentane
Cotton Wool

Copper Corrosion From Petroleum Products by the Copper Strip Tarnish Test ..... Pages 90-91

ASTM D130; FSPT DT-28-65; IP 154; ISO 2160; DIN 51759; FTM 791-5325

Filter Paper
Cotton Wool
Isooctane or volatile, sulfur-free hydrocarbon solvent
Stainless Steel Forceps
Stoddard Solvent
Kerosene

Vapor Pressure of Petroleum Products (Reid Method) .... Pages 92-94

ASTM D323, D1267; GPA 2140; IP 69, 161; ISO 3007, 4256; DIN 51616, 51754; FTM 791-1201

Dead-Weight Tester
Petroleum Naphta
Acetone
Air Supply

Wax Appearance Point of Distillate Fuels ..... Page 94

ASTM D3117

Isopropanol
Solid Carbon Dioxide
Liquid Nitrogen

Freezing Point of Aviation Fuels ..... Page 96-97

ASTM D2386; IP 16; ISO 3013; DIN 51421; FTM 791-1411

Ethanol
Methanol
Solid Carbon Dioxide
Liquid Nitrogen
Acetone
Isopropanol

Silver Corrosion by Aviation Turbine Fuels ..... Page 99

IP227; ASTM D130; FSPT DT-28-65; IP 154; ISO 2160, DIN 51759; FTM 791-5325

2,2,4-Trimethylpentane
Ashless Filter Paper
Stainless Steel Forceps
Cotton Wool

Antirust Properties of Petroleum Products Pipeline Cargoes ..... Page 98

NACE TM-0172

Naphtha or Acetone
Chromic Acid

Cold Filter Plugging Point of Distillate Fuels ..... Pages 100-101

ASTM D6371; IP 309; DIN 51428

Heptane
Lintless Filter Paper
Vacuum Pump

Lubricating Oils

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For information on additional test methods for Lubricating Oils:

–Evaporation Loss of Lubricating Greases and Oils
–please refer to pages 148-149
–Estimating Apparent Vapor Pressures and Molecular Weights of Lubricating Oils
–please refer to pages 92-94
–Please refer to the Viscosity, Flash Point and General Tests Sections
–Additional test methods are available upon request
–please call or write for information.

Foaming Characteristics of Lubricating Oils

Test Method

Foaming of lubricating oils in applications involving turbulence, high speed gearing or high volume pumping can cause inadequate lubrication, cavitation, overflow and premature oxidation. The sample is blown with a controlled volume of air at different specified temperatures, including a newer high temperature test at 150°C. The resultant foam is measured at the end of each aeration period and at different intervals afterward. In the high temperature test, the amount of time required for the foam to collapse to "0" after the aeration period is also measured.

Foaming Characteristics Test Baths

- Dual-twin models for standard foaming characteristics tests
- High temperature liquid bath for 'Sequence IV' tests
- Automatic time sequence models for both tests
- Custom configurations for specialized applications

Dual Twin Foaming Characteristics Test Apparatus–Performs two tests at 75°F (24°C) and two tests at 200°F (93.5°C). Consists of two 12x18" (30.5x45.7cm) constant temperature baths with 1000mL test cylinders, certified diffusers, air delivery tubes, and flowmeters (94mL/min.) for each sample. Baths are equipped with microprocessor temperature controls, copper immersion heaters and 1/20hp circulation stirrers to maintain temperature uniformity of ±1°F (±0.5°C). Microprocessor PID control provides quick temperature stabilization without overshoot and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. Test cylinders are held securely in place by quick-locking cams in the bath cover assembly. A separate stainless steel support rack is provided to hold the test cylinders after removal from the bath. Cold bath (24°C) has built-in coils for circulating exit air from the high temperature test cylinders prior to passing to a volume meter, and a separate coil for circulating cooling water or refrigerant when the ambient temperature exceeds the test temperature. Supplied with rubber stoppers and glass air outlet tubes for each cylinder. Bath controls are enclosed in a finished steel base with chemical resistant polyurethane enamel finish. *Communications software as seen on page 110 (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.*

FTM 791-3213 Aircraft Lubricants Test–Employs more severe conditions, smaller sample, increased air flow, and longer aeration period to test the foaming characteristics of aircraft-turbine lubricants. All models are available on special order for FTM 791-3213 testing. Please call or write for specifications and ordering information.

Specifications

Conforms to the specifications of:
ASTM D892; IP 146; DIN 51566; FTM 791-3211, 791-3213*; NF T 60-129
Temperature Control:
Digital Setpoint and Displays °C/°F switchable
Built-in Overtemperature Cut-off Protection

Included Accessories

Test Cylinders, 1000mL (4)
Diffuser Stones, calibrated and certified (4)
Air Delivery Tube Assemblies (4)
Air Outlet Tubes (4)
Rubber Stoppers (4)
Bath Jars (2)
Support Rack (1)
Acrylic Safety Shield, 18"

**Requires modifications to standard equipment.*

This equipment is available with a digital-indicating mass flow controller in place of the standard flowmeter. Please call or write for specifications and/or ordering information.

Digital Flowmeter option is available for this unit.

Software compatible, inquire with Koehler Customer Service.

K43041 Sequence IV Liquid Foaming Characteristics Apparatus

High Temperature 'Sequence IV' Liquid Foam Test Bath–For two tests at 150°C with a flow rate of 200mL/min. in accordance with ASTM D6082 specifications. Consists of a constant temperature bath with 1000mL test cylinders, certified diffusers, air delivery tubes and flowmeters. Microprocessor PID control provides quick temperature stabilization without overshoot and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. Quick response copper immersion heaters provide efficient high temperature operation, and a stirrer unit provides complete circulation for temperature uniformity of better than ±1°F (±0.5°C). Locking cams hold the test cylinders in a vertical position, and a separate rack is provided to hold the cylinders after removal from the bath. For operator safety, an acrylic heat shield surrounds the Borosilicate Glass bath jar. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.*

Specifications

Conforms to the specifications of: ASTM D6082
Temperature Control:
Digital Setpoint and Displays °C/°F switchable
Built-in Overtemperature Cut-off Protection

Included Accessories

Test Cylinders, 1000mL (2)
Diffuser Stones, calibrated and certified (2)
Air Delivery Tube Assemblies (2)
Air Outlet Tube (2)
Bath Jar (1)
Support Rack (1)
Rubber Stoppers (2)
Acrylic Safety Shield, 18"

Foaming Characteristics of Lubricating Oils

Ordering Information							
Model	**Catalog No.**	**Electrical CE Requirements**	**Bath Temperature**	**Air Flow Rate**	**Bath Capacity**	**Dimensions lxwxh,in.(cm)**	**Shipping Information**
Dual-Twin	**K43002**	115V 60Hz 15.6A	24°C (75°F) and 93.5°C (200°F) (Operator variable)	94mL/min	9 gal (38.5L) each bath	32¼x15x31¼ (82x38x79.4) Net Weight: 108 lbs (49kg)	Shipping Wgt. 217 lbs (98.4kg) Dimensions 29.6 Cu. ft.
	K43092	220-240V 50/60Hz 8.1A					
Automatic Time Sequence	**K43003**	115V 60Hz 16A				32¼x15x31¼ (82x38x79.4) Net Weight: 118 lbs (53.5kg)	Shipping Wgt. 227 lbs (103kg) Dimensions: 33 Cu. ft.
	K43093	220-240V 50/60Hz 8A					
Sequence IV Liquid	**K43041**	115V 60Hz 14A	150°C (302°F) (Operator variable)	200mL/min	9 gal (38.5L)	16¾x15x31¼ (42.5x38x79.4) Net Weight: 62 lbs (28.1kg)	Shipping Wgt. 89 lbs (40.4kg) Dimensions 16.3 Cu. ft.
	K43049	220-240V 50/60Hz 7A					

K43092 Dual-Twin Foaming Characteristics Apparatus

D892 and D6082 Dual Twin Foaming Characteristics Test Apparatus–For four tests in accordance with control ASTM D6082 and ASTM D892 specifications. Dual liquid baths feature digital temperature control for Sequences I through IV. Four flowmeters maintain the required flow rate of 94 and 200mL/min to the air diffusers. Requires the use of an external chiller to perform the Sequence I and III tests at 24°C.

Specifications

Conforms to the specifications of:
ASTM D892, D6082; IP 146; DIN 51566; FTM 791-3211; NF T 60-129
Temperature Control:
Digital Setpoint and Displays °C/°F switchable
Built-in Overtemperature Cut-off Protection

Included Accessories

Test Cylinders, 1000mL (4)
Diffuser Stones, calibrated and certified (4)
Air Delivery Tube Assemblies (4)
Air Outlet Tubes (4)
Rubber Stoppers (4)
Bath Jars (2)
Support Rack (1)
Acrylic Safety Shield, 18"

Accessories and Additional Ordering Information

For a complete listing of accessories and information on ordering a complete package for ASTM D892 and/or D6082 testing, please turn to page 110.

Ordering Information							
Model	**Catalog No.**	**Electrical CE Requirements**	**Bath Temperature**	**Air Flow Rate**	**Bath Capacity**	**Dimensions lxwxh,in.(cm)**	**Shipping Information**
D892/D6082 Dual Twin	**K43005**	115V 60Hz 15.6A	**Left (Cold) Bath:** Ambient to 93.5°C (200°F) External Chiller required to perform Sequence I and III at 24°C **Right (Hot) Bath:** Ambient to 150°C (302°F)	94mL/min and 200mL/min	9 gal (38.5L) each	32¼x15x31¼ (82x38x79.4) Net Weight: 108 lbs (49kg)	Shipping Wgt. 217 lbs (98.4kg) Dimensions: 29.6 Cu. ft.
	K43095	220-240V 50/60Hz 8.1A					

Digital Flowmeter option is available for this unit.

Software compatible, inquire with Koehler Customer Service.

Foaming Characteristics of Lubricating Oils

Advanced Communications Software Package for Data Management

Test apparatus for ASTM D892 Sequence I, II and III

Catalog No.		Order Qty
K43002	Dual Twin Foam Test Apparatus (or K43003 Automatic Time Sequence Model)	1
387-115-001	Air Pump	1
K43025	Diffuser Stone Test Apparatus	1
250-000-12F	ASTM 12F Thermometer (or 250-000-12C ASTM 12C Thermometer)	2
K43026	Wet Test Gas Meter (not required for Alternative Procedure)	1
332-005-005	Drying Tower	1

Test apparatus for ASTM D6082 Sequence IV

Catalog No.		Order Qty
K43041	Sequence IV Foam Test Bath	1
K43025	Diffuser Stone Test Apparatus	1
K43026	Wet Test Gas Meter	1
332-005-005	Drying Tower	1
387-115-001	Air Pump	1
250-000-41C	ASTM 41C Thermometer	1

Test apparatus for ASTM D892 and D6082

Catalog No.		Order Qty
K43005	D892 and D6082 Dual Twin Foam Test Apparatus	1
K43025	Diffuser Stone Test Apparatus	1
K43026	Wet Test Gas Meter	1
332-005-005	Drying Tower	1
387-115-001	Air Pump	1
250-000-12F	ASTM 12F Thermometer (or 250-000-12C ASTM 12C Thermometer)	2
250-000-41C	ASTM 41C Thermometer	2

Accessories

Catalog No.	
387-115-001	Air Pump, oil-less. Delivers 100% oil-free air. 115V 60Hz
387-230-001	Air Pump, oil-less. 220-240V 50/60Hz
K43026	Wet Test Gas Meter For volume measurements of air leaving the test cylinders. **Note:** One meter is required for each test cylinder. Not required for the 'Alternative Procedure' - Section 9.1.
332-005-005	Drying Tower. 300mm
K43025	Diffuser Stone Test Apparatus For maximum pore diameter and permeability tests on diffuser stones. Consists of 90cm manometer, 500mL flask, flowmeter, graduate, delivery tube assembly and control valve.
K33031	Refrigerated Recirculator Use with foam test baths for 24°C tests (Sequence I and III). Microprocessor based digital control and quiet running compressor provide reliable operation and accurate control within ±0.5°C. For complete specifications, please contact Koehler Customer Service. 115V 60Hz, 8A
K33032	Refrigerated Recirculator, 220-240V 50Hz, 4A
250-000-12F	ASTM 12F Thermometer. Range: –5 to +215°F
250-000-12C	ASTM 12C Thermometer. Range: –20 to +102°C
250-000-41C	ASTM 41C Thermometer. Range: 98 to 152°C
344-100-01C	Certified Diffuser Stone. Calibrated and certified for compliance with ASTM specifications for pore diameter and permeability
344-100-001	Diffuser Stone, non-calibrated
344-005-001	Stainless Steel 'Mott' Diffuser
344-005-01C	Stainless Steel 'Mott' Diffuser Certified
K43012	Test Cylinder Replacement 1000mL cylinder. Includes retaining ring.

For NIST traceable certified thermometers, please refer to the ASTM Thermometers sections on pages 184 through 191.

Water Separability of Petroleum Oils and Synthetic Fluids

Test Method

The ability of a lubricating oil to separate from water and resist emulsification is an important performance characteristic for applications involving water contamination and turbulence. Water separability is determined by stirring equal volumes of water and sample together at a controlled temperature to form an emulsion and observing the time required for separation of the emulsion to occur. This method is suitable for petroleum oils and synthetic fluids.

Water Separability Tester

- Tests emulsion characteristics of lubricating oils
- Seven sample capacity
- Movable digital stirrer with microprocessor control incorporates advanced features for flexibility and ease of operation
- Clear, illuminated heating bath provides excellent visibility
- Microprocessor temperature control with digital display and built-in protection against overtemperature and low liquid level hazards
- Conforms to ASTM, ISO and related standards for water separability testing
- Optional sensor for direct measurement of sample temperature
- With built in drain for convenient draining of bath medium

Seven-sample Water Separability Tester provides full visibility and microprocessor control of all functions for simplified, accurate testing of up to seven samples at a time. Use for specification of new oils and monitoring of in-service petroleum oils and synthetic fluids.

Seven position heating bath–A full visibility bath immerses seven 100mL cylinders at the proper depth per ASTM and ISO specifications. Sample cylinders are held securely in place by stainless steel supports inside the bath. A microprocessor based heater controls bath operating controls bath fluid temperature with greater than ±1˚C accuracy and stability throughout the operating range of 25˚C to 84˚C. Large LED readouts display setpoint and actual temperatures in Celsius or Fahrenheit scale at the operator's option. For most samples, ASTM/ISO sample temperatures of 54˚C and 82˚C are attained within 10 minutes after placement of the test cylinders into the stabilized bath. Clear polycarbonate tank has backlighting for excellent visibility when viewing emulsion separations in the test cylinders. Cut-off circuits for low water level and over-temperature conditions provide protection in the event of equipment malfunction. Easy removal of top plate for filling or cleaning the bath. Polycarbonate jar is encased in a Polyester-Epoxy finished steel housing with a protective distortion-free viewing window and a solid foundation.

Microprocessor sample stirrer–To avoid sample movement, the sample stirrer housing pivots to each test position in the bath and locks securely in place at the required position in relation to the 100mL sample cylinder. The digital stirrer offers complete flexibility for test duration and stirring speed at the push of a button. Operating speed and count down time are prominently displayed on a large backlit LCD panel. A wide operating range of 0-2000rpm permits in-house customized testing with ±1rpm accuracy, and the operator may select a stirring time of up to 99.99 minutes. At the end of the selected interval, the stirrer automatically shuts off and alerts the operator with audible and visual signals that the settling period has commenced. For added convenience, all test parameters are stored in memory and repeated in subsequent tests until they are changed by the operator. Engaging the stirrer mechanism is visible to the operator and housed in a clear tube for added safety.

For NIST traceable certified thermometers, please refer to the ASTM Thermometers sections on pages 184 through 191.

Software compatible, inquire with Koehler Customer Service.

K39400 Water Separability Tester

Specifications

Conforms to the specifications of: ASTM D1401, D6074, D6158; ISO 6614; DIN 51599; FTM 791-3201; NF T 60-125
Stirrer Range: 0-2000rpm
Accuracy: ±1.0rpm
Drive: 1/10hp (75W), high torque
Bath Temperature Range: 25˚C to 84˚C
Control Stability: ±0.05˚C
Capacity: seven (7) 100mL graduated cylinders
Construction: Clear polycarbonate tank 10"x11.25"x9.5" (25.5x28x24cm)
Medium: Water or white technical oil
Medium Capacity: 15.15L (4 gal)
Electrical Requirements: CE
115V 60Hz, Single Phase, 12A
220-240V 50/60 Hz, Single Phase, 12A

Dimensions lxwxh, in.(cm)
20.75x15.25x29.5
(52.7x38.75x 74.9)
Net Weight: 78 lbs (35.5kg)

Included Accessories
Seven 100mL Cylinders

Ordering Information

Catalog No.		Order Qty
K39400	Water Separability Tester, 115V 60Hz	1
K39496	Water Separability Tester, 230V 50/60Hz	
	Accessories	
332-002-018	Cylinder 100mL, graduated from 5 to 100mL with 1.0mL divisions	
250-000-19F	ASTM 19F Thermometer. Range: 120 to 134°F	1
250-000-19C	ASTM 19C Thermometer. Range: 49 to 57°C	
250-000-21F	ASTM 21F Thermometer. Range: 174 to 188°F	1
250-000-21C	ASTM 21C Thermometer. Range: 79 to 87°C	
K39252	PTFE Policeman	7
K39251	Test Tube Rack	1

Demulsibility Characteristics of Lubricating Oils

K39190 Demulsibility Bath With Stirrers and Funnels

Test Method

Tests the ability of medium to high viscosity oils to separate from water when water contamination and turbulence are encountered. The sample is stirred together with distilled water for 5 min. at constant temperature. After a specified settling period, the degree of separation is measured by volume and the percentage of water in oil is determined. For lighter oils and synthetic fluids, the ASTM D1401 Water Separability Test is used.

Demulsibility Apparatus

- Conforms to the specifications of ASTM D2711
- Variable stirrer speed
- Choice of digital or analog bath models

Stirrer–Complete stirrer assembly per Fig. 1 and 2 of ASTM D2711, including variable high speed drive motor, stainless steel propeller shaft, top, center and bottom bearings, and steel motor housing with positioning plate. Entire assembly mounts vertically in K39190/K39199 Constant Temperature Bath. Built-in tachometer disc allows for precise stirrer speed adjustment.

Constant Temperature Baths–Standard model holds two K39103 Stirrers and two K39120 Separatory Funnels in proper alignment for demulsibility characteristics testing. Stirrers mount securely on a stainless steel support plate having brackets for testing and drainage positions. Separate motor speed controls are provided for each stirrer. All wetted parts are constructed of stainless steel.

Microprocessor digital temperature control with dual LED displays for setpoint and actual temperatures and an illuminated bath interior with window for viewing sample cylinders. Digital LED speed control is provided for each stirrer.

Specifications

Conforms to the specifications of: ASTM D2711
Capacity: Two (2) sample-water mixtures
Maximum Temperature: 212°F (100°C)
Temperature Control: Microprocessor digital control with LED display
Bath Medium: 9 gal (38.5L) water
Electrical Requirements: CE
115V 60Hz
220-240V 50/60 Hz

Dimensions: WxDxH in (cm)
15¼x15x37 (39x38x94)
Net Weight: 72 lbs (32.6kg)

Shipping Information
Shipping Weight 133 lbs (60.3kg)
Dimensions: 25.4 Cu. ft.

Accessories

Catalog No.		Order Qty
K39120	Separatory Funnel With 0-500mL graduations. Meets ASTM specifications.	2
K39130	Solvent Tank. Immerses stirrer assembly for convenient cleaning after testing.	1
K39140	Forced Warm Air Dryer, 115V 60Hz High output 1400W dryer and brass cylinder mounted on a sturdy base. Rapidly dries stirrer assembly after cleaning.	
K39149	Forced Warm Air Dryer, 220-240V 50/60Hz	1
K39150	Sampling Gauge and Centering Device Per Fig. X1.1 of ASTM D2711. Aids in accurately obtaining 50mL samples from separatory funnels for the 'percent water in oil' determination.	1
360-000-003	Digital Tachometer Hand held non-contact LCD tachometer takes measurements up to 3 ft away with ±1rpm accuracy. Supplied with four 1.5V AA batteries.	1
250-000-09F	ASTM 9F Thermometer Range: 20 to 230°F	1
250-000-09C	ASTM 9C Thermometer Range: –5 to +110°C	
K39170	Conditioning Bath, 115V 60Hz Constant temperature water bath holds 8 separatory funnels in two removable 4-unit racks for conditioning prior to testing in Demulsibility Apparatus. Includes microprocessor digital temperature control, automatic water level control and gabled cover.	1
K39179	Conditioning Bath, 220-240V 50/60Hz	

Ordering Information

Catalog No.		Order Qty
K39190	Demulsibility Bath, 115V, 60Hz	1
K39199	Demulsibility Bath, 220-240V, 50/60Hz	
K39103	Stirrer** **Suitable for use with K39190 & K39199	2

For NIST traceable certified thermometers, please refer to the ASTM Thermometers sections on pages 184 through 191.

Software compatible, inquire with Koehler Customer Service.

Air Release Properties of Petroleum Oils

K88500 Air Release Value Apparatus

Test Method

The ability of a turbine, hydraulic, or lubricating oil to separate entrained air is a key performance characteristic in applications where agitation causes a dispersion of air bubbles in the oil. To determine air release properties, the sample is heated to a specified test temperature and blown with compressed air. After the air flow is stopped, the time required for the air entrained in the oil to reduce in volume to 0.2% is the air bubble separation time.

Air Release Value Apparatus

- Conforms to ASTM D3427, IP 313 and related specifications
- High accuracy temperature control with digital setpoint and display
- Digital control panel leads user from start to finish of test operation
- Automatic calculation of final sample density for determination of air release value
- Redundant overtemperature protection circuitry assures safe operation

The Koehler Air Release Value Apparatus consists of a test vessel and air flow control equipment for delivering heated air at the specified flow rate to a lubricating oil sample maintained at constant temperature. Microprocessor-based control panel guides user from start to finish of test operation and provides density calculation and timing operation for measuring the air release value of the test sample. The system includes drying oven for warming test oil at temperatures of up to 100°C; circulating bath with digital temperature controller and air bath for sinker; compressed air heater with digital temperature controller, overtemperature and overpressure protection circuitry; pressure gauge; thermometer. Optional Windows® software automatically measures the time for air release.

Specifications

Conforms to the specifications of:
ASTM D3427; IP 313; ISO 9120; DIN 51381; NF E 48-614
Temperature Range:
ambient to 75°C (167°F)
Electrical Requirements: CE
115V 60Hz, 3.0A
230V 50Hz, 1.5A
230V 60Hz, 1.5A

Dimensions lxwxh,in.(cm)
24x28x38¼ (61x71x97)
(Air Release Value Apparatus only)

Net Weight for complete system:
225 lbs (103kg)

Included Accessories

ASTM 12C Thermometer
Sinkers, 5mL and 10mL
Drying oven
Pressure gauge
Circulating Bath
Air Bath for Sinker
Balance
Platinum Wire
Jacketed Test Vessel

Shipping Information

Shipping Weight for complete system:
300 lbs (136kg)
Dimensions: 50.7 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K88500	Air Release Value Apparatus, 115V 60Hz	1
K88501	Air Release Value Apparatus, 230V 50Hz	
K88502	Air Release Value Apparatus, 230V 60Hz	

Software compatible, inquire with Koehler Customer Service.

Koehler INSTRUMENT COMPANY, INC.

Oxidation Stability – RPVOT & TFOUT

Oxidation Stability of Steam Turbine Oils by Rotating Pressure Vessel (Bomb)
Oxidation Stability of Inhibited Mineral Insulating Oil by Rotating Pressure Vessel (Bomb)
Oxidation Stability of Gasoline Automotive Engine Oils by Thin Film Oxidation Uptake (TFOUT)

Test Method

The RPVOT (RBOT) procedure employs severe oxidation conditions to rapidly determine oxidation stability. Suitable for both new and in-service oils, the RPVOT (RBOT) method is applicable to many types of petroleum oils. The sample is oxidized in the presence of water and a copper catalyst in a stainless steel pressure vessel under an initial pressure of 90psi (620kPa). Pressure inside the vessel is recorded electronically or mechanically while the vessel is rotated at 100rpm at constant temperature, and the amount of time required for a specified drop in pressure is the oxidation stability of the sample. A variation of the RPVOT (RBOT) method is the "Thin Film Oxidation Uptake Test" (TFOUT) for gasoline automotive engine oils.

RPVOT (RBOT) Test Apparatus

- 2, 3 and 4-unit systems
- Oxidata® Pressure Measurement System
- Conforms to ASTM D2112, D2272 and IP 229 specifications for RPVOT (RBOT) testing
- Conforms to ASTM D4742 specifications for TFOUT testing

For product specifications and ordering information:

Oxidation Pressure Vessels	*Page 114*
Oxidation Baths	*Page 116*
Beakers and Accessories	*Page 117*
Catalysts	*Page 117*
Pressure Recorder	*Page 117*
Oxidata® Pressure Measurement System	*Page 115*
Complete Systems, 2, 3 and 4-Unit	*Page 118*

Oxidation Pressure Vessel

- Polished stainless steel construction
- Can be converted for use in the Thin Film Oxidation Uptake Test (TFOUT)

Consists of pressure vessel body, cap and stem with inlet needle valve in accordance with ASTM specifications. Vessel holds one borosilicate glass sample container between two PTFE discs. Closure ring tightens by hand to seal cap to pressure vessel body. Vessel connects to pressure recorder or rotary transducer and rotates on magnetic carriage in RBOT bath. Withstands working pressure of 500psi (3450kPa) per ASTM specifications. Stainless steel construction ensures proper rate of heat transfer. Closure ring is constructed of chrome plated steel. Includes PTFE fluorocarbon wear disc and sample container cover disc.

Ordering Information

Catalog No.	
K70000	Oxidation Pressure Vessel
K70092	Aluminum Insert Converts standard K70000 Oxidation Pressure Vessel for use in the TFOUT method

Oxidata® Pressure Measurement System

Oxidata® Pressure Measurement Systems

- Electronic pressure measurement systems exclusively designed for RPVOT (RBOT), TFOUT and other ASTM oxidation test methods
- Powerful Oxidata® software for Windows® and Windows 95® environments
- Monitors up to twelve pressure and four temperature channels
- **Can be installed to most manufacturer's RPVOT(RBOT)/TFOUT test apparatus**

Complete electronic measurement systems for plotting pressure versus time and temperature in RPVOT (RBOT) and TFOUT testing. Each system includes transducers, bomb couplings, RTD probe assembly, multiplexer, data acquisition card, software, and mounting and connecting hardware. Systems are available in two, three and four pressure vessel configurations, and additional channels can be added for up to a total of twelve pressure and four temperature channels.

Koehler pressure measurement systems for RPVOT (RBOT) and TFOUT feature Oxidata®, a high accuracy pressure measurement software package designed exclusively for ASTM oxidation test methods. Designed to run in a Windows® or Windows 95® environment, Oxidata® monitors up to twelve samples simultaneously, with graphical or tabular display of results. Each channel can be independently configured for any of the applicable ASTM standard test methods without compromising the independence or accuracy of the other channels. Independent start and stop times and user programmable end points add even greater flexibility.

The software plots your data on screen on line, real time, and automatically saves your data on disk or to the hard drive during the test to prevent loss of valuable data. Multiple display options include the ability to view the status of all twelve pressure channels on screen simultaneously and then click on any one channel for a graph display; or to view four channels in graphical format simultaneously. Powerful program features allow you to change axes, have colored plot lines and zoom in on a specific plot sector to view data in greater detail.

Oxidation Stability – RPVOT & TFOUT

Oxidata® Features and Specifications

- On-line, real time monitoring of up to twelve samples simultaneously - results plot directly to the screen for instant monitoring or printout of results
- Menu options for RPVOT (RBOT) or TFOUT testing, as well as for other ASTM fuel and lubricant oxidation tests
- Programmable automatic end point detection with graphical and tabular representation
- Each channel can be configured and operated independently with different start/stop times and different ASTM test methods
- Zoom in feature allows for magnification of any plot sector on any channel for a more detailed study
- Monitors and reports temperatures of as many as four baths simultaneously using accessory RTD's, and calculates and displays average temperature for each bath. Exports data to spreadsheet programs such as Microsoft Excel®, Lotus 1-2-3®, etc.
- Temperature and pressure calibration capability
- Data is saved directly to the hard drive during testing to prevent loss of valuable data
- Operates in Windows® 2000 or higher
- Simple upgrade from existing Koehler data acquisition systems

Included Accessories (for the pressure measurement systems)

Rotary transducers (connects directly to bomb)
Data acquisition box with USB interface
Oxidata® software
Multiplexer
RTD probe assembly (1)
Mounting Bracket for bath
Connecting cables and hardware

Computer Requirements

Processor: Intel® Pentium II or similar (minimum)
Memory (RAM): 256MB or higher
Speed: 500 MHz or higher
Windows® 2000 or higher
Disk Space: 15 MB free space (minimum)
Communications Port: One USB port
Other Software: Microsoft® Excel (97 or above)
One RS232 port for temperature controller (optional)

Ordering Information

The ordering information below is for installation to Koehler equipment. For other makes of equipment, a few basic hardware items may also be required - please contact your Koehler representative for assistance.

Catalog No.

RBOT/TFOUT Electronic Pressure Measurement System CE

K70502-XP	Two-Unit System, 115V 60Hz
K70592-XP	Two-Unit System, 220-240V 50/60Hz
K70503-XP	Three-Unit System, 115V 60Hz
K70593-XP	Three-Unit System, 220-240V 50/60Hz
K70504-XP	Four-Unit System, 115V 60Hz
K70594-XP	Four-Unit System, 220-240V 50/60Hz

Oxidata® Software automatically calculates and displays the endpoint of RPVOT (RBOT)/TFOUT test methods.

Real-time plot screen displays pressure versus time for up to twelve samples simultaneously.

Oxidata® Retrofit Kits

To upgrade your existing Koehler electronic pressure measurement system to the Oxidata® software, please refer to page 118.

Oxidation Stability – RPVOT & TFOUT

Oxidation Baths

- Two, three and four-pressure vessel models
- Conforming to ASTM requirements for RPVOT (RBOT) and TFOUT testing

Constant temperature bath rotates oxidation pressure vessels at 100rpm at an angle of 30° in accordance with ASTM specifications. Includes drive system and oil bath with electronic solid state temperature control. Meets ASTM requirements for heat transfer capability and temperature control precision.

A convenient carriage arrangement allows the oxidation vessels to be inserted quickly and securely in the drive system. A strong magnet holds the vessel in place while locating pins in the carriage engage the base of the vessel. PTFE guides support the pressure vessel stem for added stability. If the vessel becomes obstructed for any reason, the magnetic carriage releases it to prevent damage. A chain and sprocket drive system powered by a heavy duty capacitor start motor rotates the vessel carriages at 100rpm. Drive shafts ride on PTFE fluorocarbon bearings which provide extended service and are compatible with silicone heat transfer fluids and other types of bath oils.

Bath temperature is controlled within ASTM specified limits by an electronic solid state controller with °C/°F switchable digital setpoint and display. Overtemperature protection is provided by a built-in limit control that automatically interrupts power to the bath when bath liquid temperature exceeds 16.7°C (30°F) above the temperature setting or 177°C (350°F). Power must then be manually restored by the operator after checking the cause of the problem. Pressure vessel carriage vanes circulate the bath oil during testing to ensure temperature uniformity, and an auxiliary stirrer can be operated between tests to prevent sludging of non-silicone bath oils.

The bath interior is constructed of welded stainless steel and is fully insulated. A hinged section of the bath cover provides easy access to the vessel carriages. Vapor barriers in the cover close around the vessel stems to contain vapors from the hot bath medium. A chemical resistant polyurethane finish protects the bath exterior and control cabinet.

Specifications

Conforms to the specifications of: ASTM D2112, D2272, D4742; IP 229
Capacity: 2, 3 or 4 oxidation pressure vessels
Temperature Control:
Maximum Temperature: 200°C (392°F)
Control Stability: ±0.02°C (±0.04°F)
Heater Range:
2 and 3-pressure vessel models: 0-2750W
4-pressure vessel models: 0-3750W
Recommended Bath Medium: high temperature silicone heat transfer fluid (355-001-002 or 355-001-004—page 8)
Drive System: 100rpm positive drive transmission powered by a continuous duty ½hp ball bearing motor with built-in gear reducer

Ordering Information

Catalog No	Capacity	Electrical Requirements CE	Bath Capacity, gal (L)	Dimensions, lxwxh,in.(cm)	Net Weight	Shipping Weight
K70200	2 oxidation	220-240V 60Hz, 17.17A	18 (68)	28x26x33	237 lbs	356 lbs (161.5kg)
K70290	vessels	220-240V 50Hz, 17.17A		(71x66x84)	(107.5kg)	25.3 Cu. ft.
K70300	3 oxidation	220-240V 60Hz, 17.17A	25 (95)	37x26x33	284 lbs	416 lbs (188.7kg)
K70390	vessels	220-240V 50Hz, 17.17A		(94x66x84)	(129kg)	32 Cu. ft.
K70400	4 oxidation	220-240V 60Hz, 21.5A	32 (121)	46x26x33	375 lbs	542 lbs (245.9kg)
K70490	vessels	220-240V 50Hz, 21.5A		(117x66x84)	(170kg)	40.3 Cu. ft.

- For verifying bath temperature in accordance with ASTM and IP test method specifications

Ordering Information

Catalog No.	
250-001-37C	IP 37C Thermometer. Range: 144 to 156°C For RPVOT (RBOT) method.
250-000-96C	ASTM 96C Thermometer. Range: 120 to 150°C For ASTM D2112 method.
250-000-100C	ASTM 100C Thermometer. Range: 145 to 205°C For TFOUT method.

For NIST traceable certified thermometers, please refer to the ASTM Thermometers sections on pages 184 through 191.

Oxidation Pressure Vessel Accessories

- Sample beakers for RBOT and TFOUT methods
- Oxygen charging accessories

Ordering Information

Catalog No.	
Sample Beakers	
K70040	RPVOT (RBOT) Sample Beaker Borosilicate glass, 175mL Meets ASTM D2112, D2272 specifications
K70091	TFOUT Sample Container Borosilicate glass. Meets ASTM D4742 specifications
Oxygen Charging Accessories	
K70080	Charging Hose. 6 ft (1.8m), with connections
K70082	Female Quick Disconnect Coupling, for charging hose
K70081-1	Male Quick Disconnect Coupling, ¼" NPT, for oxidation pressure vessel
K70013	Oxygen Pressure Regulator
Oxidation Pressure Vessel Accessories	
K70050	Silicone O-ring Replacement seal for pressure vessel lid-body connection
K70049	Sample Beaker Cover (PTFE disk)
K70048	TFOUT Sample Beaker Cover (PTFE disk)
K70000-03008	Spring. Inserts in pressure vessel to hold RPVOT (RBOT) beaker and cover in place
K700-0-3A	Spring. Inserts in pressure vessel to hold TFOUT container and cover in place

Pressure Recorder

- Conforms to ASTM D2112, D2272, D4742 and IP 229 specifications
  Records pressure inside oxidation bomb on 24-hour charts. Range 0 to 200psi, accurate to within 2% of scale range, 24-hour spring wound chart movement. Housed in a finished metal case. Includes cartridge pen.

Ordering Information

Catalog No.	
K70010/24	Pressure Recorder, 24-hour
Accessories	
K70018	Replacement Cartridge Pen
308-000-004	Recorder Chart, 24-hour Box of 60 charts

Oxidata® pressure measurement equipment is now available for the RPVOT (RBOT) and TFOUT Methods. *Please refer to page 115.*

Pressure Vessel Support Racks

- For convenient handling of oxidation pressure vessel during assembly and disassembly

Securely holds vessel-recorder assembly in an upright position. Convenient for assembling and disassembling vessel. Equipped with drainage trough for bath oil remaining on the vessel exterior after testing.

Ordering Information

Catalog No.	
K70017	Pressure Vessel Support Rack, 2-Unit
K70011	Pressure Vessel Support Rack, 3-Unit
K70012	Pressure Vessel Support Rack, 4-Unit

Catalysts

- For Rotating Pressure Vessel Oxidation Test (RPVOT)
- For Thin Film Oxidation Uptake Test (TFOUT)

Ordering Information

Catalog No.	
Copper Catalyst for RPVOT (RBOT) Method	
K70030	Copper Catalyst Coil Prepared in accordance with ASTM specifications and packed in a sealed glass container with nitrogen atmosphere. Ready to use.
K70090	Copper Catalyst Wire 1.63mm electrolytic copper wire in 500 ft (152m) lengths.
K70002	Winding Mandrel Machined aluminum mandrel for winding copper wire into coils meeting ASTM specifications. Mounts on K70003/K70004 Drive Unit
K70003	Drive Unit for Winding Mandrel Slow speed gear motor mounted on a sturdy base. Facilitates coil winding procedure. 115V
K70004	Drive Unit for Winding Mandrel Similar to K70003 but for operation on 220-240V
Catalyst Package for TFOUT Method	
K70093	Catalyst Package A For simulating IIID engine test. Includes 3 catalyst packages
K70095	Catalyst Package B For simulating IIIE engine test. Includes 3 catalyst packages

2 Unit RBOT System:

K70200	*Oxidation Bath (or K70290)*
K70000	*Oxidation Pressure Vessel (2)*
K70502-XP	*Oxidata® Pressure Measurement System (or K70592-XP)*
K70002	*Winding Mandrel*
K70003	*Drive Unit (or K70004)*
K70017	*Pressure Vessel Support Rack*
250-001-37C	*IP 37C Bath Thermometer*
K70080	*Charging Hose*
K70082	*Female Quick Disconnect Coupling for charging hose*
K70081-1	*Male Quick Disconnect Coupling for oxidation pressure vessel (2)*
K70013	*Oxygen Pressure Regulator*
K70030	*Copper Catalyst Coils*
K70090	*Copper Catalyst Wire, 500 ft.*
K70040	*Sample Container*
K70050	*Silicone O-ring*

} *Order sufficient quantity to meet anticipated testing requirements.*

3-Unit RBOT System:

K70300	*Oxidation Bath (or K70390)*
K70000	*Oxidation Pressure Vessel (3)*
K70503-XP	*Oxidata® Pressure Measurement System (or K70593-XP)*
K70002	*Winding Mandrel*
K70003	*Drive Unit (or K70004)*
K70011	*Pressure Vessel Support Rack*
250-001-37C	*IP 37C Thermometer*
K70080	*Charging Hose*
K70082	*Female Quick Disconnect Coupling for charging hose*
K70081-1	*Male Quick Disconnect Coupling for oxidation pressure vessel (3)*
K70013	*Oxygen Pressure Regulator*
K70030	*Copper Catalyst Coils*
K70090	*Copper Catalyst Wire, 500 ft.*
K70040	*Sample container*
K70050	*Silicone O-ring*

} *Order sufficient quantity to meet anticipated testing requirements.*

4-Unit RBOT System:

K70400	*Oxidation Bath (or K70490)*
K70000	*Oxidation Pressure Vessel (4)*
K70504-XP	*Oxidata® Pressure Measurement System (or K70594-XP)*
K70508	*Mounting Bracket for Four-Unit XP System*
K70002	*Winding Mandrel*
K70003	*Drive Unit (or K70004)*
K70012	*Pressure Vessel Support Rack*
250-001-37C	*IP 37C Thermometer*
K70080	*Charging Hose*
K70082	*Female Quick Disconnect Coupling for charging hose*
K70081-1	*Male Quick Disconnect Coupling for oxidation pressure vessel (4)*
K70013	*Oxygen Pressure Regulator*
K70030	*Copper Catalyst Coil*
K70090	*Copper Catalyst Wire, 500 ft.*
K70040	*Sample Container*
K70050	*Silicone O-ring*

} *Order sufficient quantity to meet anticipated testing requirements.*

For TFOUT testing, make the following substitutions:

K70091	*Sample Beaker (replaces K70040)*
K70092	*Aluminum Insert (2, 3 or 4)*
K70095	*TFOUT Catalyst Package (in lieu of K70030, K70090, K70002, K70003)*
250-000-100C	*ASTM 100C Thermometer (replaces 250-001-37C)*

Oxidata® Retrofit Kits

To upgrade existing DOS-based Koehler electronic pressure measurement systems to the Oxidata® system. Kits include Oxidata® software, data acquisition card, multiplexer board, RTD probe assembly and connecting cables. Does not include rotary transducers or bath mounting bracket. *For information on upgrading other makes of equipment to the Oxidata® system, please contact your Koehler representative.*

Ordering Information

Catalog No.	
K70502RETRO	2-Unit Oxidata® Pressure Measurement System without Transducers, 115V 60Hz
K70592RETRO	2-Unit Oxidata® Pressure Measurement System without Transducers, 220-240V 50/60Hz
K70503RETRO	3-Unit Oxidata® Pressure Measurement System without Transducers, 115V 60Hz
K70593RETRO	3-Unit Oxidata® Pressure Measurement System without Transducers, 220-240V 50/60Hz
K70504RETRO	4-Unit Oxidata® Pressure Measurement System without Transducers, 115V 60Hz
K70594RETRO	4-Unit Oxidata® Pressure Measurement System without Transducers, 220-240 50/60Hz

Accessories

K70500	Rotary Transducer Includes electronic transducer and rotating stainless steel housing
K70519	RTD Kit, for monitoring the temperature of an additional bath

For NIST traceable certified thermometers, please refer to the ASTM Thermometers sections on pages 184 through 191.

Test Method

Various methods are available for testing the resistance to oxidation and/or the corrosiveness of lubricants, insulating oils, hydraulic oils and distillate fuel oils. The samples are subjected to a metered flow of air at elevated temperatures, sometimes in the presence of a metal catalyst. Each of the tests referenced on this page are also represented on other pages in this section of the catalog.

High Temperature Convertible Oxidation Bath

- Conforms to various ASTM, Federal and International Standards
- Removable racks hold different types of glassware for different tests
- Equipped with flowmeters or digital mass flow controls to measure and control the required flow rates
- Microprocessor digital temperature control

High temperature liquid bath for oxidation stability and corrosiveness tests at temperatures of up to 200°C. Available in different configurations for convertibility between several oxidation stability and corrosivity test methods including Cummins oxidation test. Removable rack/top plate assemblies remove and install with minimum effort to easily convert the bath between test methods. For most test methods, twelve sets of glassware can be accommodated in each rack assembly. Select flowmeters or digital mass flow control to maintain air flow at the required rates. Microprocessor PID control provides quick temperature stabilization without overshoot, and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communication software (RS232, etc.) ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.*

Specifications

Conforms to the specifications of*:
ASTM D943, D2274, D2440, D2893, D4310, D4636, D4871**, D5968, D6594; DIN 51394, 51586, 51587; FTM 791-5307, 791-5308
*with the appropriate glassware rack and flow control equipment installed –see ordering information.
****Modified versions of this equipment are available for D4871 (UOT) test method.**
Capacity: Twelve (12) sets of glassware. For ASTM D5968, FTM 791-5307, and FTM 791-5308, only ten (10) sets of glassware.
Temperature Range: Ambient to 200°C
Temperature Control Accuracy: 0.2°F (0.1°C)
Bath Medium: Silicone heat transfer fluid
Flow Rate: As specified for ASTM or applicable specifications
Electrical Requirements: CE
115V 60Hz, Single Phase, 27.3A
220-240V 50/60Hz, Single Phase, 14.6A

Dimensions lxwxh,in.(cm)
Bath (without glassware): 25½x24x42(65x61x107)

Shipping Information (without glassware)
Shipping Weight: 213 lbs (96.6kg)
Dimensions: 29 Cu. ft.

Digital Flowmeter option is available for this unit.

Software compatible, inquire with Koehler Customer Service.

K12230 High Temperature Convertible Oxidation Bath

Ordering Information

Catalog No.
Please contact your Koehler representative for information on glassware racks and airflow control options prior to order placement.

K12230	High Temperature Convertible Oxidation Bath, 115V 60Hz
K12239	High Temperature Convertible Oxidation Bath, 220-240V 50/60Hz

Accessories

K1223-R943	Sample Rack for D943, D2274, D2983, D4310 testing
K1223-R2440	Sample Rack for D2440 testing
K1223-R4636	Sample Rack for D4636, D5968, D6594 testing
K1223-3L	Flowmeter Stand with Flowmeters for D943, D2274, D2440, D4310 testing (range 3 ±0.1 L/hr)
K1223-10L	Flowmeter Stand with Flowmeters for D2893, D4636, D5968, D6594 testing (range to 10 ±0.5 L/hr)

To order glassware and other accessories please refer to the pages in this section of the catalog that correspond to the test methods that you will be following.

Oxidation Characteristics of Inhibited Mineral Oils

Sludging and Corrosion Tendencies of Inhibited Mineral Oils

Oxidation Stability of Distillate Fuel Oil (Accelerated Method)

Oxidation Characteristics of Extreme-Pressure Lubrication Oils

Test Method

Evaluates oxidation stability by subjecting the sample to a temperature of 95°C in the presence of oxygen or dry air. For inhibited mineral oils, the sample is reacted with oxygen in the presence of water and an iron-copper catalyst.

Oxidation Stability Apparatus

- Thirty and sixty-place liquid baths for high volume testing requirements
- Eight and twelve-place liquid baths for benchtop placement
- Twelve-place solid block bath
- Conforming to ASTM and related test method specifications
- Special baths for ASTM D2893 and AOCS CD12-57 tests

For product specifications and ordering information:
30 and 60-place Oxidation Baths - page 121
Solid-Block Oxidation Bath - page 121
Oxidation Cell Glassware and Accessories - page 122
Iron-Copper Catalyst and Thermometers - page 122

Eight and Twelve-Place Oxidation Baths

- Conforming to ASTM and related test method specifications

Constant temperature baths with solid state temperature control, calibrated flowmeters and condenser water manifold for oxidation stability tests on fuels and lubricants. Individual flowmeters and control valves for each oxidation cell deliver air flow at the rate of 3L/h. Condenser water manifold has individual control valves for each cell. Microprocessor PID control provides quick temperature stabilization without overshoot, and the bath is protected by a redundant overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Display provides actual setpoint temperature values in °C/°F format. Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Double-wall insulated baths are equipped with copper immersion heaters and a ⅓₀ hp circulation stirrer. Stainless steel bath interior has a built-in support rack and overflow/drain to immerse the test cells at the required depth. Order oxidation cell glassware and accessories separately.

Dimensions lxwxh,in.(cm)
8-place model: 17½x25x42 (44x64x107)
12-place model: 22x14x42 (57.15x35.56x107)

Shipping Information:
Shipping Weight:
8-place model: 137 lbs (62.1kg)
12-place model: 213 lbs (96.6kg)
Dimensions:
8-place model: 29 Cu. ft.
12-place model: 29 Cu. ft.

Digital Flowmeter option is available for this unit.

Software compatible, inquire with Koehler Customer Service.

K12219 Oxidation Stability Bath

Specifications

Conforms to the specifications of:
ASTM D943, D2274, D2893*, D4310, D6158; AOCS CD12-57**
DIN 51586, 51587; ISO 4263, ISO 12205; NF M 07-047; NF T 60-150
Test Capacity: 8 or 12 oxidation cells
Temperature Range: ambient to 212°F (100°C)
Temperature Control Stability: ±0.2°F (±0.1°C)
Bath Medium: white technical oil
Bath Capacity:
8-place model: 10 gal (37.8L)
12-place model: 19 gal (71.9L)
Electrical Requirements: CE

8-place model:	115V 60Hz, Single Phase, 13.0A
	220-240V 50/60Hz, Single Phase, 6.8A
12-place model:	115V 60Hz, Single Phase, 32.6A
	220-240V 50/60Hz, Single Phase, 17.0A

Ordering Information

Catalog No.	
K12200	Oxidation Bath, 8-Unit, 115V 60Hz
K12290	Oxidation Bath, 8-Unit, 220-240V 50/60Hz
K12212	Oxidation Bath, 12-Unit, 115V 60Hz
K12219	Oxidation Bath, 12-Unit, 220-240V 50/60Hz

**Modified versions of this equipment are available for ASTM D2893*
***"Oxidation Characteristics of Extreme Pressure Lubricating Oils" and AOCS CD12-57 "Fat Stability-Active Oxygen Method." Information will be furnished upon request.*

30- and 60-Place Oxidation Baths

- Convenient operation and servicing of thirty or sixty test cells
- Complete bath temperature, water level, air flow and condenser water systems

Constant temperature water baths for high volume oxidation stability applications. Provides temperature control, metered air flow and condenser water supply controls for as many as thirty or sixty cells in a single system, eliminating the need for multiple water and electrical feeds and oxygen supply tanks. Microprocessor PID control provides quick temperature stabilization without overshoot, and the bath is protected by a redundant overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Display provides actual setpoint temperature values in °C/°F format. Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. A 6 or 12kW heat exchanger with heavy duty magnetic drive circulation pump provides rapid and uniform heat transfer throughout the bath. Bath liquid depth is automatically maintained within ASTM specified tolerances by an electronic water level control system. Two banks of individually controlled flowmeters maintain the required oxygen flow rate to each test cell, and condenser water control valves for each cell are mounted on manifolds along the sides of the bath. A centrally mounted trough collects condenser waste water for convenient disposal or recirculation through an external cooling device. Bath interior is constructed of heavy gauge welded stainless steel. All components are easily accessible for servicing if required. Supplied with a sturdy finished angle-iron frame for floor standing installation. Order oxidation cell glassware and accessories separately.

Specifications

Conforms to the specifications of:
ASTM D943, D2274, D2893*, D4310, D6158; ISO 4263, 12205
AOCS CD12-57*; DIN 51586, DIN 51587; NF M 07-047; NF T 60-150
Temperature Control Stability: ±0.1°C (±0.2°F)
Oxygen Flow Rate: 3L/h to each test cell, individually controlled
Bath Capacity:
30-place model: 60 gal (227L)
60-place model: 114 gal (432L)
Electrical Requirements: CE
30-place model: 220-240V 50/60Hz, Single Phase, 28A
60-place model: 220-240V 50/60Hz, Single Phase, 54A
Other electrical configurations are available upon request.

Dimensions lxwxh,in.(cm)

30-place model: 43x55x52 (109x140x132)
60-place model: 43x78x52 (109x198x132)

Shipping Information

Shipping Weight:
30-place model: 892 lbs (404.6kg)
60-place model: 995 lbs (451.3kg)

Dimensions:
30-place model: 94 Cu. ft.
60-place model: 148 Cu. ft.

Ordering Information

Catalog No.	
K12330	30-Place Oxidation Stability Bath, 220-240V 60Hz
K12339	30-Place Oxidation Stability Bath, 220-240V 50Hz
K12300	60-Place Oxidation Stability Bath, 220-240V 60Hz
K12395	60-Place Oxidation Stability Bath, 220-240V 50Hz

Photograph, thermometers, and additional accessories for oxidation stability testing appear on page 122.

**Modified versions of this equipment are available for ASTM D2893 "Oxidation Characteristics of Extreme Pressure Lubricating Oils" and AOCS CD12-57 "Fat Stability Active Oxygen Method." Information will be furnished upon request.*

Available option for 30- and 60-place Oxidation Baths–temperature/pressure recorder with built-in alarms for low pressure and over/under temperature. Please call or write for specifications and ordering information.

Software compatible, inquire with Koehler Customer Service.

Advanced Communications Software Package for Data Management

12-Place Solid-Block Oxidation Bath

- Accommodates twelve oxidation cells
- Microprocessor digital temperature control

Constant temperature aluminum block oxidation bath with flowmeters and condenser water manifold for twelve cells. Insulated solid block design provides efficient operation at temperatures of up to 450°F (232°C). Microprocessor temperature control unit features digital setpoint and display and built-in overtemperature protection. Includes individual flowmeters and control valves for each cell, delivering air flow at the rate of 3L/h. Condenser water manifold has individual control valves for each cell. Order oxidation cell glassware and accessories separately.

Specifications

Conforms to the specifications of:
ASTM D943, D2274, D2893*, D4310, D6158; AOCS CD12-57*;
DIN 51586, 51587; ISO 4263, 12205; NF M 07-047; NF T 60-150
Testing Capacity: 12 oxidation cells
Maximum Temperature: 450°F
Temperature Control Stability: ±0.2°F (±0.1°C)
Air Flow Rate: 3L/h
Electrical Requirements: 220-240V 50/60Hz, Single Phase, 16A CE

Dimensions lxwxh,in.(cm)

30x10x43 (76x25x109)
Net Weight: 345 lbs (156.5kg)

Shipping Information

Shipping Weight: 440 lbs (199.6kg)
Dimensions: 12 Cu. ft.

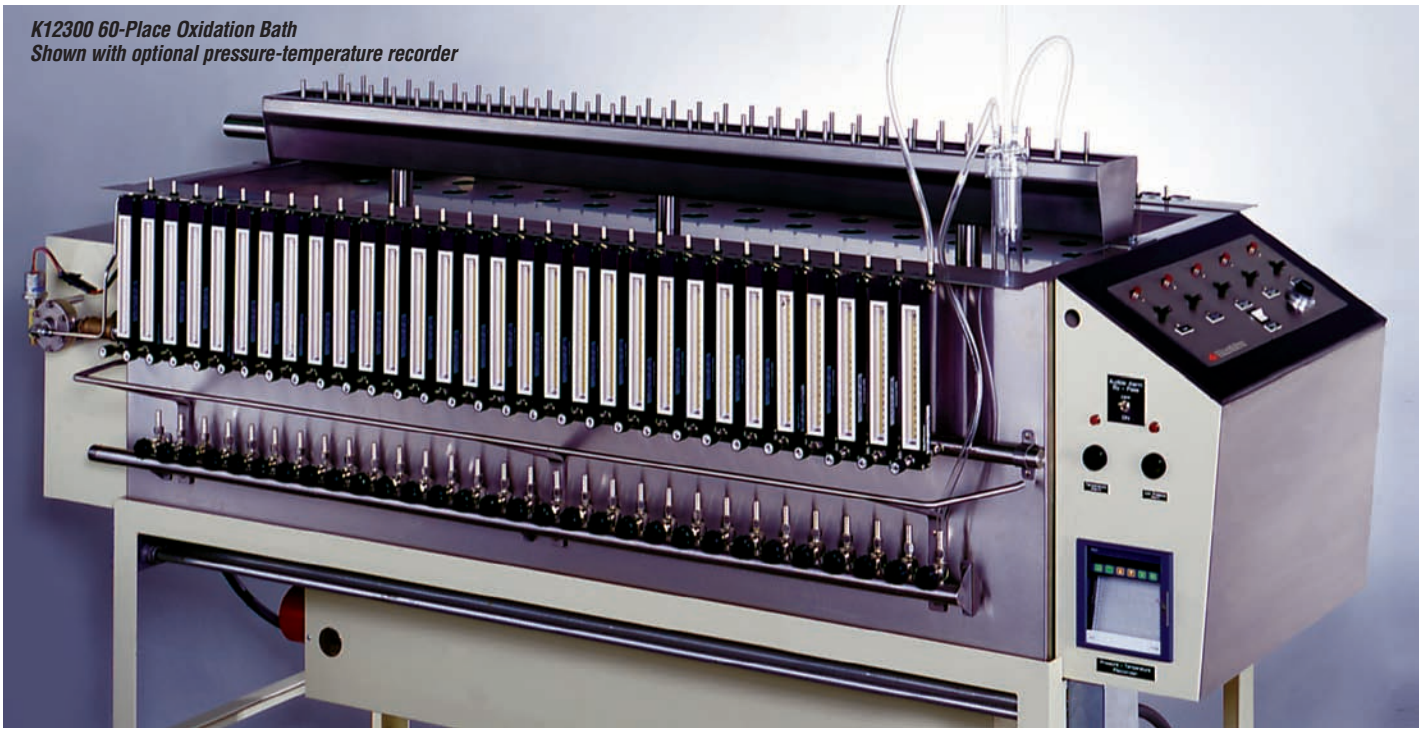
Solid block baths meet temperature control and other requirements of ASTM and related methods. While the aluminum block design offers operating advantages over the standard oil bath, it should be noted that many applicable specifications for this test call for a liquid bath medium.

Ordering Information

Catalog No.	
K12201	12-Place Solid Block Oxidation Bath, 220-240V 50/60Hz

**Modified versions of this equipment are available for ASTM D2893 "Oxidation Characteristics of Extreme Pressure Oils" and AOCS CD12-57 "Fat Stability-Active Oxygen Method." Information will be furnished upon request.*

Digital Flowmeter option is available for this unit.



K12300 60-Place Oxidation Bath
Shown with optional pressure-temperature recorder

Oxidation Cell Glassware and Accessories

Ordering Information	
Catalog No.	
K12281	Oxidation Cell Assembly for ASTM D943 and D4310 Includes oxidation cell, condenser, oxygen delivery tube, thermometer bracket, oil level indicator strip, syringe sampling tube, sampling tube holder, spacer, PTFE stopper and O-rings
K122-0-18	Oxygen Delivery Tube
K122-0-19	Oxidation Test Tube
K122-0-20	Condenser
K122-0-21	Thermometer Bracket
K122-0-22	Oil Level Indicator Strip
K122-0-23	Syringe Sampling Tube Holder
K122-0-27	PTFE Stopper
K122-0-28	Syringe Sampling Spacer
K122-0-30	Syringe Sampling Tube
AS568-009-V14	O-rings

For ASTM D2274, order one each K122-0-18 Oxygen Delivery Tube, K122-0-19 Oxidation Test Tube, and K122-0-20 Condenser for each cell.

For NIST traceable certified thermometers, please refer to the ASTM Thermometers sections on pages 184 through 191.

Digital Flowmeter option is available for this unit.

Iron-Copper Catalyst

For ASTM D943 and D4310

Ordering Information	
Catalog No.	
K12210	Catalyst Coil Low-metalloid steel wire and electrolytic copper wire wound in a double spiral conforming to ASTM specifications. Packed in a sealed glass tube with a nitrogen atmosphere. Ready for use.
K24000	Wire Coiling Mandrel Mounts on bench for winding steel and copper wire into catalyst coils meeting ASTM specifications.
K12250	Steel Wire Low metalloid steel wire, 0.0625" (1.59mm) diameter, for catalyst coils. Supplied in 1000 ft (304.8m) lengths.
K12260	Copper Wire Electrolytic copper wire, 0.064" (1.63mm) diameter, for catalyst coils. Supplied in 1000 ft (304.8m) lengths.
380-100-001	Silicone Carbide Paper Used to polish steel and copper wire prior to winding into catalyst coils. 100 grit.

Thermometers

Ordering Information	
Catalog No.	
250-002-001	Oxidation Cell Thermometer Range: 80 to 100°C. For ASTM D943 and D4310.
250-000-40C	ASTM 40C Thermometer Range: 72 to 126°C. For constant temperature baths.

Oxidation Stability of Mineral Insulating Oils

K12100 Oxidation Stability Bath

Test Method

Determines oxidation stability of mineral transformer oils by measuring the amount of sludge and acid formed under prescribed accelerated aging conditions.

Oxidation Stability Bath

- Conforms to ASTM D2440 specifications
- Microprocessor temperature control with digital display and overtemperature cut-off
- Six-sample testing capacity

Constant temperature oil bath for testing oxidation stability of mineral insulating oils. Immerses six oil receptacles at the required depth per ASTM specifications at 110°C ± 0.5°C, and controls oxygen flow to each sample at the rate of 1L/h ± 0.1L/h through six independent flowmeters mounted on a common manifold. Insulated double-wall stainless steel bath has microprocessor temperature control with °C/°F switchable digital setpoint and display. Operator and equipment are protected by an overtemperature control circuit which automatically interrupts power to the unit when bath temperature exceeds a programmed cut-off point. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Order bath thermometer drying tower and catalyst separately.

Specifications

Conforms to the specifications of:
ASTM D2440
Capacity: Six samples
Temperature Range: ambient to 260°F (127°C)
Circulator: ½0hp impeller
Bath Capacity/Medium: 2.5 gal (9.5L) white technical oil
Electrical Requirements: CE
115V 60Hz, Single Phase, 8.1A
220-240V 50/60Hz, Single Phase, 4.2A

Included Accessories

Oil Receptacle and Head (6)

Dimensions lxwxh,in.(cm)

14x15x22 (36x38x56)
Net Weight: 31 lbs (14.1kg)

Shipping Information

Shipping Weight: 61 lbs (27.7kg)
Dimensions: 14.4 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K12100	Oxidation Stability Bath, 115V 60Hz	1
K12190	Oxidation Stability Bath, 220-240V 50/60Hz	

Accessories

K12130	Copper Catalyst Coils Sealed in a glass jar with a nitrogen atmosphere. Pack of 24 (12 sets)	1
332-005-010	Drying Tower 250mL with ground glass stopper and side tubes	1
332-005-011	Glass Filter Crucible	1
250-000-95C	ASTM 95C Thermometer Range: 100 to 130°C	1
355-001-001	White Technical Oil 1 gal container. See page 8 for specifications.	3
355-001-003	White Technical Oil 5 gal container. See page 8 for specifications.	1

For NIST traceable certified thermometers, please refer to the ASTM Thermometers sections on pages 184 through 191.

Digital Flowmeter option is available for this unit.

Software compatible, inquire with Koehler Customer Service.

Koehler INSTRUMENT COMPANY, INC.

K35100 FTM 791-5307 Model with accessory glassware

Specifications

Conforms to the specifications of:
ASTM D4636, D5968, D6594; FTM 791-5307, 791-5308;
IHC BT-10; DIN 51394
Capacity: 6 test cells
Temperature Range:125 to 750°F (51.7 to 399°C)
Temperature Control Stability: ±1°F (±0.5°C)
Air Flow Rate: ASTM D4636/FTM 791-5307: 10L/h
FTM 791-5308: 3L/h and 5L/h (dual range flowmeters)
IHC BT-10: 3L/h (50mL/min.)
Electrical Requirements: 220-240V 50/60Hz, Single Phase, 15.9A CE

Dimensions lxwxh,in.(cm)
32½x14½x41½ (83x37x105)
Net Weight: 271 lbs (122.9kg)

Shipping Information

Shipping Weight: 375 lbs (170.1kg)
Dimensions: 18.5 Cu. ft.

Digital Flowmeter option is available for this unit.

Software compatible, inquire with Koehler Customer Service.

Corrosiveness and Oxidation Stability of Hydraulic Oils, Aircraft Turbine Engine Lubricants, and Other Highly Refined Oils

Test Method

Evaluates the ability of a lubricant to resist oxidation and the formation of corrosive acid compounds by subjecting a sample to accelerated oxidation conditions in a catalytic environment. The sample is maintained at elevated temperature and subjected to a controlled air flow while in the presence of a series of test specimens made of metals commonly found in actual service conditions.

Corrosiveness and Oxidation Stability Test Apparatus

- Models for ASTM, Federal and IHC test methods
- Six-sample testing capability
- Solid aluminum block design
- Microprocessor temperature control with digital display and overtemperature protection

Constant temperature block baths for corrosivity and oxidation stability determinations on hydraulic oils, aircraft turbine lubricants, transmission fluids and other highly refined oils. Insulated aluminum block provides safe, efficient performance at operating temperatures of up to 750°F (399°C). Microprocessor temperature control has °C/°F switchable digital setpoint and display. Operator and equipment are protected by an overtemperature control circuit which automatically interrupts power to the unit should block temperature exceed a programmed cut-off point. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Air flow is controlled at the specified rate by six individually adjustable flowmeters mounted on a common manifold. Includes inlet valve and outlet fitting for condenser water supply and support rack for glassware.

Ordering Information

Catalog No.		Order Qty
Corrosivity and Oxidation Stability Test Apparatus		1
K35100	ASTM D4636, D5968 and FTM 791-5307 Model, 220-240V 50/60Hz	
K35000	FTM 791-5308 Model, 220-240V 50/60Hz	
K35300	IHC BT-10 Model, 220-240V 50/60Hz	
Thermometers		
250-000-08F	ASTM 8F Thermometer Range: 30 to 760°F	
250-000-08C	ASTM 8C Thermometer Range: –2 to +400°C	

For NIST traceable certified thermometers, please refer to the ASTM Thermometers sections on pages 184 through 191.

Corrosiveness and Oxidation Stability

Glassware, Test Specimens and Accessories

Catalog No.		Order Qty
ASTM D4636, D5968, D6594 and FTM 791-5307		
K351-0-1	Sample Tube	6
K351-0-2	Sample Tube Head	6
K351-0-3	Air Tube	6
K351-0-4	Thermocouple Tube	6
K351-0-5	Condenser, Allihn Type	6
K351-0-6	Oil Sampling Tube (for D4636)	6
K351-0-7	Spacer	36
K351-0-8	PTFE Adapter	6
K351-0-13	Oil Sampling Tube (for D5968 and FTM 791-5307)	
K351-0-14	Specimen Hanger (for D6594)	
K293-0-12	Thermocouple, Type J	6
K29319	Digital Thermometer, 220-240V Microprocessor based digital thermocouple thermometer with ten-channel input. Monitors Type J thermocouples from sample tubes.	1
K35090	Test Panel Assembly Fixture Holds square-shaped metal specimens for tying with cord (for ASTM D4636 Alternate Procedure and FTM 791-5308)	1
K35095	Test Panel Assembly Fixture Holds square-shaped metal specimens for tying with cord (for ASTM D5968)	1
FTM 791-5308		
K350-0-23	Test Tube	6
K350-0-24	Air Tube	6
K350-0-25	Condenser	6
K35090	Test Panel Assembly Fixture Holds square-shaped metal specimens for tying with cord.	1
IHC BT-10		
K353-0-1	Test Cell	6
K353-0-2	Condenser	6
K353-0-3	Air Tube	6
K353-0-4	Ring Rod	6

Metal Test Specimens

Catalog No.	
Washer Shaped Specimens for ASTM D4636 Standard Procedure and for FTM 791-5307	
K35110	Bronze
K35120	Mild Steel
K35130	Aluminum Alloy
K35140	Magnesium
K35150	Steel M50
K35160	Silver
K35170	Titanium
Square Shaped Specimens for ASTM D4636 Alternate Procedure and for FTM 791-5308	
K35010	Copper
K35020	Mild Carbon Steel
K35030	Aluminum Alloy
K35040	Magnesium Alloy
K35050	Cadmium Plated Steel
K35060	Silver
K35070	Solid Cadmium (non standard)
K35080	Titanium (non standard)
Square Shaped Specimens for ASTM D5968 and D6594	
K35010	Copper
K35011	Lead
K35012	Tin
K35013	Phosphor Bronze
Rectangular Shaped Specimens for IHC BT-10	
K353-0-5	Aluminum
K353-0-6	Copper
K353-0-7	Steel
K353-0-8	Brass

Polishing Materials

380-150-001 Silicone Carbide Paper, 150-grit, Pack of 50 sheets
380-240-001 Silicone Carbide Paper, 240-grit, Pack of 50 sheets
380-150-000 Silicone Carbide Grain, 150-grit, 1 lb package

K56100 Cigre Bath with K56110 Glassware

Oxidation Stability of Inhibited Mineral Turbine Oils

Oxidation Stability of Straight Mineral Oil

Oxidation Stability of Mineral Insulating Oil

Oxidation Stability of Inhibited Mineral Insulating Oils

Oxidation Test For Lubricating Oil

Test Method

Oxidation stability is determined by exposing the sample to a measured oxygen flow at elevated temperature in the presence of metal catalysts.

Oxidation Stability Apparatus (Cigre Bath)

- Conforms to IP specifications
- Twelve-sample testing capability
- Microprocessor programmable high accuracy temperature control

Constant temperature aluminum block type bath for oxidation stability tests in accordance with the Institute of Petroleum (IP) testing methods. Accommodates twelve sets of oxidation and absorption tubes. Insulated block bath operates efficiently at temperatures of up to 200°C (392°F). Microprocessor PID control provides quick temperature stabilization without overshoot, and the bath is protected by a an overtemperature control circuit that interrupts power should block temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* A bank of twelve flowmeters on a movable stand regulates oxygen flow at 1 ±0.1L/h to each oil sample per IP specifications. Includes soap bubble flowmeter for checking oxygen flow rate.

Specifications

Conforms to the specifications of:
IP 48, IP 280, IP 306, IP 307, IP 335
Testing Capacity: Twelve samples
Temperature Range: 80 to 200°C
Temperature Uniformity: ±0.2°C
Air Flow Control:
Standard Model: 1L/h to each sample
IP 48 Model: 15L/h to each sample
Electrical Requirements: CE
115V 60Hz, Single Phase, 12.1A
220-240V 50/60Hz, Single Phase, 6.3A

Ordering Information

Catalog No.		Order Qty
K56100	Oxidation Stability Apparatus 115V 60Hz	1
K56190	Oxidation Stability Apparatus 220-240V 50/60Hz	
K56200	Oxidation Stability Apparatus 115V 60Hz For IP 48 Method.	
K56290	Oxidation Stability Apparatus 220-240V 50/60Hz For IP 48 Method	
	Accessories	
K56110	Set of Glassware Includes one each oxidation and absorption tube. For IP 48, IP 280, IP 306, IP 307, IP 335	12
250-000-09C	ASTM 9C Thermometer Range: –5 to +110°C (equivalent to IP 15C Thermometer)	1
250-000-41C	ASTM 41C Thermometer Range: 98 to 152°C (equivalent to IP 81C Thermometer)	

A liquid bath version of this equipment to perform the proposed ASTM test for High Temperature Stability of Distillate Fuels is also available. Please contact Koehler's Customer Service for additional information.

Included Accessories

Soap Bubble Flowmeter

Dimensions

Bath: dia.xh,in.(cm)
17x22 (43.2x55.9)
Flowmeter Stand: lxwxh,in.(cm)
24x8x30¼ (61x20.3x76.8)
Net Weight: 186 lbs (84.4kg)

Shipping Information

Shipping Weight: 245 lbs (111.1kg)
Dimensions: 16.7 Cu. ft.

For NIST traceable certified thermometers, please refer to the ASTM Thermometers sections on pages 184 through 191.

Digital Flowmeter option is available for this unit.

Software compatible, inquire with Koehler Customer Service.

Thermal Oxidation Stability of Automotive Gear Lubricants

Test Method

The L-60-1 Performance Test determines the deterioration of gear lubricants under severe thermal oxidation conditions. The sample lubricant is tested for 50 hours in a standardized gear box operating under a predetermined load. An elevated temperature and controlled air flow are maintained throughout the test and a copper catalyst is employed to accelerate the breakdown. At the end of the test period, various lubricant properties are determined by standard testing methods, and the weight loss of the catalyst is measured. The deposits that are formed on the gear box surfaces and the catalyst are examined and reported.

Ordering Information

Catalog No.	
K18660	L-60-1 Performance Test Apparatus, 220-240V 60Hz
K18650	L-60-1 Performance Test Apparatus, 220-240V 50Hz

Accessories

K18661	Test Kit, for one test. Includes GA34 test gear, GA50 test gear, R-14 test bearing, viton shaft seals (2), O-ring seal, copper test strips (2)
380-150-001	Silicone Carbide Paper, 150-grit (pack of 50)

K18660 L-60-1 Performance Test Apparatus

L-60-1 Performance Test Apparatus

• Conforms to ASTM D5704 and STP512A L-60-1 Performance Test specifications. Performs the L-60-1 Thermal Oxidation Stability performance test for API GL-5 gear lubricant service. Consists of a standardized gear box assembly with motor drive system and digital indicating controls for all test functions.

Gear Case and Drive System

Two spur gears and a test bearing are operated inside a machined stainless steel case with removable window. The drive gear shaft is coupled to a heavy duty ball bearing motor loaded by a 45 ampere alternator. The standard L-60-1 test gear loading value of 128 watts generator output is precisely maintained by a digitally indicated load bank. All gear box components are easily accessible for cleaning.

Temperature Control

An insulated heating case with high volume blower encloses the gear box. Sample oil temperature is maintained at 325°F ± 1°F (162.8 ± 0.6°C) by a digital indicating controller with PT-RTD sensor. A built-in microprocessor based recorder produces a test oil temperature chart for reporting purposes. Overtemperature protection is provided by a separate PT-RTD-sensed controller.

Air Flow Control

A high accuracy mass flow controller with digital indication maintains air flow to the gear box at a constant 1.1L/h. The self correcting controller maintains the setpoint flow rate regardless of fluctuations in air input pressure or temperature. Test cabinet and control cabinet are finished in chemical resistant polyurethane enamel. Test cabinet has a cover for access to the gear box and a removable drive motor cover.

Specifications

Conforms to the specifications of:
- ASTM D5704; STP512A L-60-1 Performance Test (formerly CRC L-60 Test); FTM 791-2504

Controls and Monitors:
- Sample Oil Temperature: °C/°F, digital setpoint and display, user adjustable
- Overtemperature Limit Control: °F, user acceptable
- Heating Chamber Air Temperature:°C/°F
- Air Flow: L/h, digital setpoint and display, user adjustable
- Test Gear Load: Volts DC, Amps. DC, digital display, user adjustable
- Sample Oil Temperature Recorder: Programmable microprocessor based strip chart recorder with digital display, °C/°F
- Drive Motor: 1725rpm thermally protected ball bearing type
- Alternator: 45 ampere output

Electrical Requirements: CE
- 220-240V 60Hz, Single Phase, 15A
- 220-240V 50Hz. Single Phase, 15A

Dimensions lxwxh,in.(cm)
- Test Cabinet: 24x24x14½ (61x61x37)
- Control Cabinet: 23½x23½x17⅜ (60x60x44)

Net Weight: 330 lbs (149.7kg)

Shipping Information

Shipping Weight: 498 Lbs (225.9kg)
Dimensions: 29.2 Cu. ft.

Koehler INSTRUMENT COMPANY, INC.

Rust Preventing Characteristics

K30160 Rust Preventing Characteristics Bath

Specifications

Conforms to the specifications of:
ASTM D665, D3603, D6158; NACE TM-01-72*; IP 135; ISO 7120; DIN 51355**, DIN 51585; FTM 791-4011, 791-5315**; NF T 60-151
Testing Capacity: Six (6) 400mL sample beakers
Maximum Temperature: 104°C (220°F)
Temperature Control Stability: ±0.5°C (±1°F)
Drive Motor: ½hp induction motor
Bath Medium: 11 gal (41.6L) white technical oil
Electrical Requirements: CE
115V 60Hz, Single Phase, 13.0A
220-240V 50 or 60Hz, Single Phase, 6.8A

Included Accessories

ASTM D665 Models (K30160, K30165, K30166)
Steel Test Specimens (6)
Type 2 Plastic Specimen Holders (6)
Plastic Beaker Covers (6)

ASTM D3603 Models (K30161, K30167, K30168)
Horizontal Disc Test Assembly (6) consisting of:
plastic beaker cover
horizontal test specimen
vertical test specimen
fluorocarbon washer
plastic cap
stainless steel support rods and hardware

Dimensions lxwxh,in.(cm)

32¾x14¼x27 (83x36x69)
Net Weight: 79 lbs (35.8kg)

Shipping Information

Shipping Weight: 150 lbs (68kg)
Dimensions: 16.2 Cu. ft.

**Accessories for these test methods are available upon request.

Software compatible, inquire with Koehler Customer Service.

Rust Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water (Standard and Horizontal Disc Methods)

Test Method

Determines a lubricant's ability to prevent rusting of metal surfaces. Suitable for steam turbine oils, gear oils, hydraulic oils and other types of inhibited mineral oils. A steel test specimen is immersed in a heated mixture of sample oil and water which is stirred continuously during the test. After the test period the specimen is examined for rusting. The standard (ASTM D665) method uses a vertical specimen; the 'horizontal disc method' (ASTM D3603) uses both horizontal and vertical test surfaces.

Rust Preventing Characteristics Oil Bath

- Conforms to ASTM D665, D3603 and NACE TM-01-72* specifications
- Accommodates six sample beakers
- Microprocessor programmable high accuracy temperature control

Constant temperature bath with stirrers for rust preventing characteristics tests. Stirs sample-water mixtures at 1000rpm and controls temperature with ± 0.5°C (± 1°F) stability. Immerses test beakers at the proper depth per ASTM specifications.

Microprocessor PID control provides quick temperature stabilization without overshoot, and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.*

Stainless steel stirrer paddles are driven by a ball bearing type motor through an improved pulley drive-roller bearing arrangement. Paddles can be raised and lowered for placement of sample beakers in the bath. Includes test specimens, holders and beaker covers for ASTM D665 or D3603 testing (see specifications and ordering information). Stainless steel bath includes perforated support shelf for beakers and two-position cover plate that adjusts for either ASTM D665 or D3603 testing. Long-lasting polyester drive belt improves reliability. Drive train components are protected by a removable steel guard. All exterior surfaces have stainless steel or chemical resistant polyurethane enamel finishes.

Ordering Information

Catalog No.	
Rust Preventing Characteristics Oil Bath	
For ASTM D665	
K30160	Rust Preventing Characteristics Oil Bath, 115V 60Hz
K30165	Rust Preventing Characteristics Oil Bath, 220-240V 50Hz
K30166	Rust Preventing Characteristics Oil Bath, 220-240V 60Hz
For ASTM D3603	
K30161	Rust Preventing Characteristics Oil Bath, 115V 60Hz
K30167	Rust Preventing Characteristics Oil Bath, 220-240V 50Hz
K30168	Rust Preventing Characteristics Oil Bath, 220-240V 60Hz

*To order this equipment for the NACE TM-01-72 test please turn to page 98.

Rust Preventing Characteristics

K30800 Horizontal Disk Assembly

K30101 Specimen with Holder

K30130 Chuck

Accessories

Catalog No.		Order Qty
332-002-006	Test Beaker, 400mL for ASTM D665 & D3603	6
250-000-09F	ASTM 9F Thermometer Range: 20 to 230°F	7
250-000-09C	ASTM 9C Thermometer Range: –5 to +110°C	
K30130	Chuck for polishing test specimens Includes locknut and shaft for mounting on accessory drive motor.	1
K30150	Drive Motor Drives K30130 Chuck. Mounted on base. 115V 60Hz	1
K30180	Drive Motor Similar to K30150 but for operation on 220-240V 50Hz	
380-150-002	Aluminum Oxide Cloth, 150-grit for preliminary grinding of test specimens Pack of 50	
380-240-002	Aluminum Oxide Cloth, 240-grit for final polishing of test specimens Pack of 50	1
K30140	Auxiliary Stirrer Blade - Attaches to stirrer shaft - for testing heavier than water samples - ASTM D665. Procedure C.	

Test Specimens

Catalog No.	
K30110	Steel Test Specimen for ASTM D665 Machined to ASTM specifications. Without Holder
K30100	Test Specimen with Type 2 Plastic Holder for ASTM D665
K30119	Test Specimen with Type 1 Plastic Holder for ASTM D665
K30101	Test Specimen with Type 2 PTFE Holder
K30810	Horizontal Test Specimen for ASTM D3603
K30820	Vertical Test Specimen for ASTM D3603
K30800	Horizontal Disc Rust Test Assembly for ASTM D3603. Includes polycarbonate beaker cover, two stainless steel support rods, disc carrier and one each horizontal and vertical test specimens.

For NIST traceable certified thermometers, please refer to the ASTM Thermometers sections on pages 184 through 191.

Corrosion of Lead by Lubricating Oils

Test Method

Measures the corrosiveness of lubricating oils to lead in the presence of a copper catalyst. Lead and copper test panels are rotated in the test lubricant under specified test conditions, and the degree of corrosion is determined by the change in weight of the lead panel.

Lead Corrosion Test Apparatus

- Conforms to FTM 791-5321 specifications
- Six-sample capacity
- Microprocessor programmable high accuracy temperature control

Constant temperature apparatus rotates copper and lead test panels in lubricant samples to determine corrosiveness to lead per FTM specifications. Panels are rotated at 600rpm in samples maintained at 163°C (325°F) and aerated at 0.94L/min. (2.0 Cu. ft./hr.).

Test panel shafts ride on ball bearing spindles driven by a 1/15hp motor. A counterbalanced support bar positions the drive shaft for testing or for mounting and removal of test panels. When the support bar is raised, a safety microswitch automatically stops the drive motor to prevent splashing of hot oil.

Fully insulated bath features double-wall stainless steel construction, with a built-in support rack to suspend test cells vertically at the proper depth. Microprocessor PID control provides quick temperature stabilization without overshoot, and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* A 1/20hp stirrer thoroughly circulates the bath medium for temperature uniformity. Redundant overtemperature protection is provided by a built-in backup thermostat. Flowmeters and valves mounted on a convenient manifold provide individual air flow control for each test cell.

Digital Flowmeter option is available for this unit.

Specifications

Conforms to the specifications of:
FTM 791-5321
Testing Capacity: 6 lubricant samples
Maximum Temperature: 199°C (390°F)
Temperature Control Stability: ±0.05°C (±0.1°F)
Air Flow Control: 0.94±0.047L/min.
(2±0.1 Cu. ft./hr) six (6) flowmeters mounted on a common manifold
Electrical Requirements: CE
220-240V 60Hz, Single Phase, 14.5A
220-240V 50Hz, Single Phase, 14.5A

Included Accessories

Copper Test Panels (6)
Lead Test Panels (6)
Mounting Hardware for Panels

Dimensions lxwxh,in.(cm)

39x25x47 (99x64x119)
Net Weight: 214 lbs (97kg)

Shipping Information

Shipping Weight: 330 lbs (150kg)
Dimensions: 33.5 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K29900	Lead Corrosion Apparatus, 220-240V 60Hz	1
K29990	Lead Corrosion Apparatus. 220-240V 50Hz	
	Accessories	
K29910	Borosilicate Glass Sample Tube	6
250-000-16F	ASTM 16F Thermometer Range: 85 to 392°F	1
250-000-16C	ASTM 16C Thermometer Range: 30 to 200°C	
K29920	Lead Test Panels	
K29930	Copper Test Panels	

For NIST traceable certified thermometers, please refer to the ASTM Thermometers sections on pages 184 through 191.

Stability of Lubricating Oils (Work Factor)

Test Method

Determines the stability of a lubricating oil when subjected to an endurance test in a journal bearing operated under prescribed conditions. After a 100 hour test period, the 'work factor' is computed from measured changes in viscosity, neutralization number and carbon residue.

Navy Work Factor Machine

- Conforms to FTM 791-3451 specifications

Complete apparatus for the 'Navy Work Factor' stability test for lubricating oils. Consists of bearing and journal, bearing loading device with calibrated springs, 5hp drive system with variable speed control, oil circulation system, and full instrumentation. Operates the journal bearing at 2000 or 3000rpm under a specified load. Oil system pressure is maintained at a constant 15 psig (103 gauge kPa) throughout the test. Includes digital displays of oil pressure and temperature and a built-in strip chart recorder for hard copy test reports.

Specifications

Conforms to the specifications of: FTM 791-3451.4
Electrical Requirements: 220-240V, 3 Phase, 50/60Hz, 20A CE

Dimensions lxwxh,in.(cm)

50x40x60 (127x102x152)
Net Weight: 1378 lbs (625.1kg)

Shipping Information

Shipping Weight: 1660 lbs (753kg)
Dimensions: 110 Cu. ft.

Ordering Information

Catalog No.	
K30000	Navy Work Factor Machine, 220-240V *Specify 50 or 60Hz when ordering*
K30010	Replacement Test Bearing

Copper Corrosion from Petroleum Products

Test Method

The Copper Strip Tarnish Test assesses the relative degree of corrosivity of petroleum products, including lubricating oils. A polished copper strip is immersed in 30mL of sample at elevated temperature. After the test period, the strip is examined for evidence of corrosion and a classification number from 1-4 is assigned based on a comparison with the ASTM Copper Strip Corrosion Standards.

Copper Strip Tarnish Test Apparatus

- Conforms to ASTM D130, D6074, D6158 and related specifications

The complete apparatus for the Copper Strip Tarnish Test for lubricating oils consists of:

Test Tube Bath
Copper Strips
Test Tubes
ASTM Copper Strip Corrosion Test Standard
Surface Preparation Accessories

Test Tube Bath

- Accommodates 17 test tubes
- Temperature range to 190°C (374°F)
- Microprocessor temperature control with digital display and overtemperature protection.

Constant temperature bath immerses 16 test tubes for copper strip tarnish tests of products not requiring a test bomb. Microprocessor temperature control has °C/°F switchable digital setpoint and display. Operator and equipment are protected by an overtemperature control circuit which automatically interrupts power to the unit should bath temperature exceed a programmed cut-off point. Welded stainless steel double-wall construction with built-in support rack. Fully insulated. For complete specifications, please refer to page 90.

Ordering Information

Catalog No.		Order Qty
K25330	Copper Strip Test Tube Bath, 115V 60Hz	1
K25339	Copper Strip Test Tube Bath, 220-240V 50/60Hz	
K25312	Vented Cork	

Accessories

K25080	Copper Test Strips 12.5x1.5-3.0mmx75mm to ASTM specifications	17
332-004-004	Test Tube, 25x150mm	17
332-004-002	Viewing Test Tube Protects copper strip during inspection or storage	17
K25100	ASTM Copper Strip Corrosion Standard Colored reproductions of tarnished strips encased in a plastic plaque	1
380-220-001	Silicone Carbide Paper, FEPA Grade, 220 grit For polishing of copper strips prior to testing Pack of 50 sheets	
380-150-003	Silicone Carbide Grain, FEPA grade, 150 grit For final polishing of copper strips prior to testing 1 lb package	
K25000	Polishing Vise Holds copper strip firmly in place without marring the edges. Stainless steel. mounted on a composition base	1
K25090	Multi-Strip Polishing Vise. Similar to K25000 but capable of holding four strips at a time	1
250-000-12F	ASTM 12F Thermometer, Range: –5 to +215°F	1
250-000-12C	ASTM 12C Thermometer, Range: –20 to +102°C	

Bearing Compatibility of Turbine Oils

Test Method

Evaluates the in-service stability of turbine lubricants by running a sample-lubricated babbit journal bearing for an extended period at high speed under controlled conditions of load, lubricant flow and temperature. The change in various properties (viscosity, carbon residue, acidity) is measured at the end of the endurance test and the bearing is cleaned and examined for evidence of deposits, corrosion and other changes.

Bearing Compatibility Tester

- Conforms to FTM 791-3452 specifications
- Digital-indicating controls and built-in temperature recorder

Tests the bearing compatibility (lacquering, deposits, corrosion) and stability of turbine lubricants when subjected to an endurance test. Consists of bearing housing assembly with test bearing and support bearings, hydraulic loading device, oil circulation system with thermostatic and hydrostatic control, and powerful 5hp variable speed drive system. Digital LCD controls monitor oil pressure, oil temperature and spindle rpm, and a built-in strip chart recorder plots oil temperature at three different points—at the bearing housing, in-line, and in the reservoir. Equipped with overtemperature and low pressure cut-off switches and a cartridge oil filter for convenient 'flush run' operation. All components are mounted in a sturdy angle iron frame. A removable steel guard protects drive train components.

Dimensions lxwxh,in.(cm)
48x36x54 (122x91x137)
Net Weight: 1300 lbs (589.7kg)

Shipping Information
Shipping Weight: 1582 lbs (717.6kg)
Dimensions: 101.7 Cu. ft.

Specifications

Conforms to the specifications of: FTM 791-3452
Journal Drive Motor: 5hp variable speed, with digital 0-3500rpm control.
Fan cooled with thermal overload protection.
Lubricant Flow: 3.8L/min. gear pump recirculating 1.9-23L/min.
of test lubricant to support bearing and test bearing.
Digital oil pressure circulation.
Temperature Control: Sump temperature (0-500°F) with digital indication and recording of temperature at bearing housing, sump and in-line.
Bearing Load: Hydraulic loading device maintaining 1520 kPa (220 psig) on the loading bearing.
Electrical Requirements: CE
200-240V 50/60Hz, 3-Phase, 20A
380V 50/60Hz, 3-Phase, 12A
440V 50/60Hz, 3-Phase, 10A

Ordering Information

Catalog No.		Order Qty
K29800	Bearing Compatibility Tester *Specify electrical requirements when ordering.*	1

Accessories

K29801	Test Bearing	

For NIST traceable certified thermometers, please refer to the ASTM Thermometers sections on pages 184 through 191.

Cloud Point and Pour Point of Petroleum Products

K46100 Refrigerated Bench Model

Ordering Information

Catalog No.

Cloud and Pour Point Chamber

K46000 Cloud and Pour Point Chamber
K46001 Cloud and Pour Point Chamber, with inlet/outlet fittings

Refrigerated Models:

K46100 Cloud and Pour Point Bath, Bench Model, 115V 60Hz
K46195 Cloud and Pour Point Bath, Bench Model, 220-240V 50Hz
K46196 Cloud and Pour Point Bath, Bench Model, 220-240V 60Hz
K46300 Cloud and Pour Point Bath, Floor Model, 115V 60Hz
K46395 Cloud and Pour Point Bath, Floor Model, 220-240V 50Hz
K46396 Cloud and Pour Point Bath, Floor Model, 220-240V 60Hz
K46500 Cloud and Pour Point Bath, Floor Model, 5-Bath, 115V 60Hz
K46595 Cloud and Pour Point Bath, Floor Model, 5-Bath, 220-240V 50Hz
K46596 Cloud and Pour Point Bath, Floor Model, 5-Bath, 220-240V 60Hz

Accessories

332-004-001	Test Jar Clear, flat bottom jar with sample height graduation
250-000-05F	ASTM 5F Thermometer, range: –36 to +120°F
250-000-05C	ASTM 5C Thermometer, range: –38 to +50°C
250-000-06F	ASTM 6F Thermometer, range: –112 to +70°F
250-000-06C	ASTM 6C Thermometer, range: –80 to +20°C
K46120	Cork Disk
K46130	Foam Sponge Disc
AS568-219	Gasket, for test jar
K460-0-8	Thermometer Holder, for test jar
K460-1-7B	Copper Jacket

For NIST traceable certified thermometers, please refer to the ASTM Thermometers sections on pages 184 through 191.

Custom configurations of this bath are available. Please contact Koehler Customer Service for additional information.

Software compatible, inquire with Koehler Customer Service.

Test Method

Cloud point and pour point are indicators of the lowest temperature of utility for petroleum products. The sample is periodically examined while it is being cooled in the cloud and pour point apparatus. The highest temperature at which haziness is observed (cloud point), or the lowest temperature at which movement of the oil is observed (pour point), is reported as the test result.

Cloud and Pour Point Test Equipment

- Conforms to ASTM D97, D2500 and related specifications
- Compact four-place portable chamber
- Mechanically refrigerated models with factory preset cold baths

Cloud and Pour Point Chamber–Immerses four copper test jackets in suitable freezing mixtures at the required depth per ASTM specifications. Available with inlet and outlet connections for circulating refrigerated coolant from an external source. Consists of steel exterior housing with polyurethane enamel finish and all copper interior for corrosion resistance. Removable composition top plate and ½" (13mm) cork insulation around interior aid in cold retention. Supplied with copper jackets, gaskets, disks, and thermometer holders for test jars and cooling bath. Order test jars and thermometers separately.

Mechanically Refrigerated Baths–Bench-model and floor-model test units with multiple four-jacket mechanically refrigerated baths, each factory preset at a different temperature for convenient cloud and pour point testing. Bench model has three baths, set at +32, 0 and -27°F (0, -18 and -33°C); floor model available with either four or five baths, set at +32, 0, -27 and -60°F (0, -18, -33 and -51°C) and +32, 0, -27, -60 and -92°F (0, -18, -33, -51, and -69°C) respectively. Each bath has a phenolic top plate with ports for thermometer and four copper test jackets. Synthetic sponge covers over each top plate and gasketed hoods over each bath prevent excessive ice accumulation around the test jackets. Cascade hermetic refrigeration system provides reliable long term service. Bath interior is made of stainless steel, cabinet is constructed of polyester-epoxy finished steel housing. Floor model rides on swivel castors. Supplied with test jackets, gaskets, disks, and thermometer holders for test jars and cooling baths.

Specifications

Conforms to the specifications of:
ASTM D97, D2500, D5853, D6074, D6158; IP 15, 219;
ISO 3015, 3016; DIN 51597; FTM 791-201; NF T 60-105
Electrical Requirements: CE
Model K46100 Refrigerated Bench Model:
115V 60Hz, Single Phase, 12.2A
220-240V 50/60Hz, Single Phase, 6.9A
Model K46300/K46500 Refrigerated Floor Model:
115V 60Hz, Single Phase, 17.7A
220-240V 50/60Hz, Single Phase, 9.7A

Dimensions

K46000: dia.xh,in.(cm)
10½x12 (27x30)
K46100: lxwxh,in.(cm)
30x28x35 (76x71x89)
K46300/K46500: lxwxh,in.(cm)
44x38x4 (112x97x115)
Net Weight:
K46000: 14 lbs (6.3 kg)
K46100: 340 lbs (155 kg)
K46300/K46500: 392 lbs (178 kg)

Shipping Information

Shipping Weight:
K46000: 18 lbs (8.2 kg)
K46100: 550 lbs (250 kg)
K46300/K46500: 605 lbs (275 kg)
Dimensions:
K46000: 2.6 Cu. ft.
K46100: 14.1 Cu. ft.
K46300/K46500: 60.6 Cu. ft.

Automated Cloud Point and Pour Point of Petroleum Products

Test Method

For Petroleum Products, cloud point and pour point of a petroleum product is an index of the lowest temperature of its utility for certain applications. The specimen is cooled at a specified rate and examined periodically. The highest temperature at which a cloud is first observed at the bottom of the test jar is recorded as the cloud point. The lowest temperature at which movement of the specimen is observed is recorded as the pour point.

Automatic Cloud Point and Pour Point Analyzer with Integrated Panel PC

- Cloud Point Analyzer conforms to ASTM D2500, D5771, D5772, D5773 and related test methods
- Pour Point Analyzer conforms to ASTM D97, D5853, D5950 and related test methods
- Stand alone system with Integrated Touch Screen Panel PC
- Direct Cooling system eliminates the need for solvent cooling baths
- One-stage cooling system provides temperatures as low as -45°C and a two-stage cooling system down to -80°C
- Cloud Point measured by light pulsed emission on I.R spectrum through a coaxial fiber optic
- Pour Point measured by two PT100 detection probes placed on the surface of the product and a mechanical moving arm bringing the test jar to a horizontal position

Cloud Point Detection–The cloud point detection system provides automated sample testing with the accuracy and repeatability in accordance with ASTM D2500, D5771, D5772, D5773 and related international test methods. The sophisticated dynamic measuring system emits a light pulse every 1°C from a coaxial fiber optic cable positioned above the test sample. The light pulse is then reflected off the silver bottom test jar to an optical sensor. The advanced software package analyzes the response of the light pulse. The initial appearance of crystallization is monitored by light scattering, signifying the cloud point of the sample. All clear and transparent oils are readily measured by the detection system, regardless of sample color.

Pour Point Detection–The pour point detection system provides automated sample testing with the accuracy and repeatability in accordance with ASTM D97, D5853, D5950 and related international test methods. The automated operation involves removing the sample from the cooling jacket at 3°C intervals and tilting it to a 90° angle as prescribed by the test method until no flow is observed. Contact of the cold sample with the two PT100 detection probes positioned just above the surface liquid level when the test jar is tilted identifies sample flow. The test jar is automatically returned to the cooling jacket and sampled again until no flow is detected for 5 seconds. The pour point result is then reported at 3°C higher than the temperature at which the sample ceased to flow in accordance with the test method.

Integrated Panel PC and Software Package–The Automated Cloud and Pour Point Analyzers are complete standalone systems featuring an integrated panel PC with an advanced software package. The 6.4" TFT/LCD touch screen display has a resolution of 640x480 with a 262K color scheme. All analytical parameters are graphed and displayed in real time as well as recorded in Microsoft® Excel compatible file format. The software monitors the operation and performance of all the analyzer components for proper data measurement, including the solenoid valves, cooling system, pressure sensors, and the Platinum resistance PT100 Class A temperature probe.

Cooling System–For various user applications, the automated cloud and pour point systems are available with either one-stage cooling for temperatures as low as -45°C or two-stage cooling for temperatures as low as -80°C. The direct cooling system features integrated gas CFC free motors compressors thus eliminating the need for a solvent cooling bath. The direct system is capable of rapid cooling, approaching -80°C bath temperatures in approximately 15 minutes, and utilizes less electricity than standard cooling systems. The rapid cooling feature combined with a consistent cooling profile system provides repeatable results with high test reproducibility.

KLA-3-TS
Automatic Cloud & Pour Point Analyzer with Touch Screen

Multiple Configuration System–These automated sample cooling and physical property measurement systems can be configured with one, two, three, four and six test positions with one of five possible analytical heads at each position: cloud point, pour point, cloud & pour point, cold filter plugging point and freezing point. Standard and customized multiple configuration systems are readily available.

Specifications

Conforms to the specifications of:
KLA-1-TS: ASTM D2500, D5771, D5772, D5773; DIN 51597; IP 219, IP 444, IP 445, IP 446; ISO 3015
KLA-2-TS: ASTM D97, D5853, D5950; IP 15, IP441; ISO 3016
KLA-3-TS: ASTM D97, D2500, D5771, D5772, D5773, D5853, D5950; DIN 51597; IP 15, IP 219, IP441, IP 444, IP 445, IP 446; ISO 3015, ISO 3016
Temperature Range:
One-Stage: +60°C to -45°C
Two-Stage: +60°C to -80°C
Resolution: 0.06°C
Accuracy: ±0.1°C
Repeatability / Reproducibility: as per standard test methods or better
Data Storage: < 60,000 analyses
Electrical Requirements: CE
115V ± 15% / 60Hz
220V ± 15% / 50 to 60Hz

Dimensions WxDxH,in.(cm)
26 x 23¾ x 31½ (66x60x80)
Net Weight: 176.5 lbs (80kg)

Ordering Information

Catalog No.	
KLA-1-TS	Auto Cloud Point Analyzer, Touch Screen (One-stage)
KLA-1-TS/2	Auto Cloud Point Analyzer, Touch Screen (Two-stage)
KLA-2-TS	Auto Pour Point Analyzer, Touch Screen (One-stage)
KLA-2-TS/2	Auto Pour Point Analyzer, Touch Screen (Two-stage)
KLA-3-TS	Auto Cloud & Pour Point Analyzer, Touch Screen (One-stage)
KLA-3-TS/2	Auto Cloud & Pour Point Analyzer, Touch Screen (Two-stage)

Please specify voltage requirements when ordering.

Accessories

KLA-PT100-CAL	Calibration Decade Box - PT100 Simulator
KLA-DB-KIT	Set of Connectors and Cables

Extended Cooling Range down to -100°C Available Upon Request.

Koehler INSTRUMENT COMPANY, INC.

Dielectric Breakdown Voltage of Insulating Oils

Test Method

The majority of high-voltage transformers, cables, switchgears, transducers, capacitors, and rectifiers use insulating oils for insulating electrically live parts and to carry off thermal energy. The quality of the insulating oil must be checked at regular intervals to ensure a long equipment service life. The most important requirement of an insulating oil is a high dielectric strength. Determination of the dielectric breakdown voltage of insulating oils provides an early detection method for any reduction in the insulating properties.

Automatic Portable Dielectric Breakdown Tester

- Conforms to ASTM D877, D1816 and related test specifications
- Output voltage: 75kV
- Features 2.8" ultra bright color display for optimal readability and mobility
- Built-in printer offers direct evaluation and reporting of results
- Internal battery, external 12V power supply
- Automatic Vernier function for electrode gap spacing
- Measurement of Silicone based oils
- Internal temperature measurement of oil sample
- Bluetooth PC Connectivity and USB Flashdrive Capability

Specifications

Conforms to the specifications of:
ASTM D877, D1816; BS EN 60156; CEI EN 60156; IEC 156; VDE 0370 Pt. 5
Output Voltage: Up to 75kV rms symmetrical
Voltage measurement accuracy: 0 - 75kV ±1kV
Voltage slew rate: 0.5 - 10kV/s
Resolution (displayed): 0.1kV
Power Supply: 85V - 264V, 47Hz - 63Hz, 12V external supply CE
Power consumption: 60VA
Internal rechargeable battery: 1 x 12V / 7.2Ah
Switch-off time on flashover: < 5µs
Measurement of oil temperature: 0 - 100°C / 32 - 212°F
Temperature Resolution: 1°C / 1.8°F
Display: 2.8" color (ultra bright)
Selectable Programs: ASTM D1816-04-1mm, ASTM D1816-04-2mm, ASTM D877-02A, ASTM D877-02B, IEC 156/95
Customer-specific programs: Unlimited
PC Software: Included
Printer: Dot Matrix Hard Copy Output
Interface: Bluetooth
USB: USB memory stick
Operating Temperature: -5°C - 45°C (23°F - 113°F)
Storage Temperature: -20°C - 60°C (-4°F

Included Accessories

Calibration Sheet	AC Power Cable	Integrated Battery
User Manual	PC Software	Integrated Printer

K16175 Automatic Portable Dielectric Tester

Dimensions WxHxD,in.(cm)
16.9x11x9.85 (43x28x25)
Net Weight: 48.5 lbs (22kg)

Shipping Information

Shipping Weight: 54.5 lbs (24.7kg)
Dimensions: 25x21x19in. (63.5x53.4x48.3cm)

Ordering Information

Catalog No.	
K16175	Automatic Dielectric Breakdown Tester, 0-75kVAC, 100-240V 50/60Hz

Accessories

K16175-4	Transport Case
K16175-5	Test Vessel complete with electrodes for ASTM D1816
K16175-6	Test Vessel complete with electrodes for ASTM D877
K16175-23	IEC156 Test Cell with VDE Electrode
K16175-24	IEC156 Test Cell with Sphere Electrode
K16175-12	Spacer Gauge, 1mm
K16175-13	Spacer Gauge, 2mm
K16175-14	Spacer Gauge, 2.5mm

Coking Tendency of Oil

K50100 Panel Coker

Test Method

Determines the tendency of finished oils to form coke when in contact with surfaces at elevated temperatures for short periods. A sample of oil is mechanically splashed against an aluminum test panel at elevated temperature. After a specified test period, the amount of coke deposited on the panel is determined by weight.

Panel Coking Test Apparatus

- Conforms to FTM 791-3462 specifications
- Suitable as a screening test prior to performing engine tests

Digitally controlled panel coking apparatus for finished lubricating oils, consisting of mechanical splasher, splash chamber and sample oil reservoir Test panel temperature and oil sump temperature are individually controlled by separate heaters with digital-indicating controllers. Mechanical splasher has a variable speed 0-1800rpm drive motor with digital indicating control. A high accuracy variable area flowmeter permits introduction of a corrosive acidic atmosphere to increase the severity of the test. Equipped with a digital countdown timer. Hinged safety cover has a port for fume removal and a safety interlock switch that interrupts power to the drive motor when the cover is lifted.

Specifications

Conforms to the specifications of:
FTM 791-3462
Maximum Temperature:
Test Panel: 400°C (752°F)
Sample Oil: 210°C (410°F)
Temperature Control: Separate controls for test panel and oil temperature, with digital °C/°F digital setpoint and display
Splashing Rate: 0-1800rpm, with digital display
Timer: 0-99.9 hr variable countdown
Flowmeter Range: 0.2-1.0L/hr
Oil Reservoir Capacity: 0.35 liter
Electrical Requirements: CE
115V 60Hz, 8A
220-240V 50/60Hz, 5A

Dimensions lxwxh,in.(cm)

Test Unit: 32x18x21 (81x46x53)
Control Cabinet:
18x12x18 (46x30x46)
Net Weight:
Test Unit: 50 lbs (22.7kg)
Control Cabinet: 25 lbs (11.3kg)

Shipping Information

Shipping Weight: 135 lbs (61.2kg)
Dimensions: 26.7 Cu. ft.

Digital Flowmeter option is available for this unit.

Software compatible, inquire with Koehler Customer Service.

Ordering Information

Catalog No.		Order Qty
K50100	Panel Coking Test Apparatus, 115V 60Hz	
K50110	Panel Coking Test Apparatus, with cyclic timer 115V 60Hz	
K50119	Panel Coking Test Apparatus, with cyclic timer 220-240V 50/60Hz	
K50190	Panel Coking Test Apparatus, 220-240V 50/60Hz	
	Accessories	
K50101	Aluminum Test Panel	1
K50102	Stainless Steel Test Panel (Type 321)	1

Koehler INSTRUMENT COMPANY, INC.

Evaporation Loss of Lubricating Oils by the Noack Method

K44100 Automatic Non-Woods Metal Noack Evaporative Apparatus

Test Method

For determining the evaporation loss of lubricating oils, particularly engine oils. High temperatures can evaporate oil which may contribute to oil consumption in an engine and can lead to a change in the properties of an oil. A measured quantity of sample is placed in an evaporation crucible that is then heated to 245.2°C with a constant flow of air drawn through it for 60 minutes. The loss in mass of the oil is determined.

Automatic Non-Woods Metal Noack Evaporative Apparatus

- Conforms to ASTM D5800, Procedure B
- 6.5" Integrated Touch Screen Panel PC
- Integrated Vacuum Pump with automatic electronic control system
- Direct sample temperature measurement via PT100 probe
- Equipped with high resistant Kalrez valve, inlet filter to remove product residuals
- USB port for connection to an external printer and/or external PC
- Storage capacity for more then 60,000 analysis
- CE Marked

The Automatic Non-Woods Metal Noack Evaporative Apparatus tests for the evaporation loss tendencies of lubricating oils at temperatures of up to 275°C. The newly designed electrically heated aluminum block allows for testing without the use of hazardous Woods Metal. The Noack tester is equipped with an Electronic regulator allowing for automatic control of temperature and differential pressure. The system is managed by an integrated 6.5" Touch Screen Panel PC by means of the Noack Evaluation Software run by a Windows® based operating system. The Evaluation Software is capable of recording all analytical parameters, allowing for user customizable parameters, methods and result reports as well as printing graphs and test results.

Specifications

Conforms to the specifications of:
ASTM D5800 Procedure B; IP 421; DIN 51581
Capacity: 1 Sample
Temperature Range: 225°C to 275°C
Temperature Resolution: 0.01°C
Temperature Accuracy: ±0.2°C
Repeatability/Reproducibility: Meets or Exceeds ASTM D5800
Ambient Temperature: Max. 35°C
Relative Humidity: Max 80%
Heater Power: 420W
Electrical Requirements: CE
115V 60Hz
220V 50/60Hz

Included Accessories

Integrated Touch Screen Panel PC
Integrated Vacuum Pump
Inlet Filter
Evaporation Crucible
Test Ball (10)
Nozzle Cleaner
Crucible Holder
Protective Gloves
Hook Wrench
Pliers

Dimensions lxwxh,in.(cm)

15.75x17.72x17.72 (40x45x45)
Net Weight: 48.5 lbs (22 kg)

Ordering Information

Catalog No.	
K44100	Automatic Non-Woods Metal Noack Evaporative Apparatus 115V 60Hz
K44190	Automatic Non-Woods Metal Noack Evaporative Apparatus 220V 50/60Hz

Accessories

K44100-SFW	Noack Evaluation Software
K44100-1	Glassware Accessory Set Includes: 2L Glass Bottle (2), Rubber Stopper (4), Glass Delivery Tubes, Silicon Connection Tubing
K44100-2	Stand for Glass Bottles with Inclined Manometer, 0-50mm H2O
K44100-3	Noack Reference Oil, 1 Liter
KLA-DB-KIT	Set of Calibration Connectors and Cables
KLA-PT100-CAL	Calibration Decade Box – PT100 Simulator

Additional Accessories

Additional equipment, materials and/or reagents are required to perform some of the test procedures in the preceding pages. Please refer to the applicable test method for further information, or contact Koehler for assistance.

Foaming Characteristics of Lubricating Oils ..... Pages 108-110

ASTM D892; IP 146; DIN 51566; FTM 791-3211, 791-3213

Air Supply
Acetone
Desiccant
Toluene
Isopropanol
Cotton

Water Separability of Petroleum Oils and Synthetic Fluids ..... Page 111

ASTM D1401; ISO 6614; DIN 51599; FTM 791-3201

Precipitation Naphtha
Nochromix
Cotton
Acetone
Distilled Water

Demulsibility Characteristics of Lubricating Oils ..... Page 112

ASTM D2711 and DIN 51353

Centrifuge
Distilled Water
Centrifuge Tubes
1,1,1-Trichloroethane

Oxidation Stability of Steam Turbine Oils and Inhibited Mineral Insulating Oils by Rotating Bomb ..... Pages 114-118

ASTM D2112, D2272; IP 229

Liquid Detergent
Potassium Hydroxide
Acetone
Chloroform
Oxygen
Petroleum Spirit
Hydrochloric Acid
Isopropanol

Oxidation Stability of Gasoline Automotive Engine Oils by Thin-Film Oxidation Uptake (TFOUT) ..... Pages 114-118

ASTM D4742

Liquid Detergent
n-Hexane
Potassium Hydroxide
Isopropanol
Acetone
Oxygen
Air Supply
Water

Oxidation Stability of Distillate Fuel Oil (Accelerated Method) ..... Pages 119-122

ASTM D2274

Drying Oven
Membrane Filters
Hot Plate
Oxygen
Acetone
Toluene
Filter Assembly
Beaker, 200mL
Isooctane
Water Supply
Methanol

Oxidation Characteristics of Inhibited Mineral Oils ..... Pages 119-122

ASTM D943; DIN 51587

Desiccant Bags
Abrasive Cloth
Distilled Water
Detergent
Hydrochloric Acid
Oxygen
Gloves
Acetone
Glass Syringes, 10 and 50mL
Flexible Tubing
n-Heptane
Isopropanol
Nitrogen

Sludging Tendencies of Inhibited Mineral Oils ..... Pages 119-122

ASTM D4310

Syringe, 50mL
Acetone
n-Heptane
Chromic Acid
Filter Holder
Separatory Funnel
Forceps
Nitrogen
Desiccant Bags
Isopropanol
Flexible Tubing
Detergent
Hydrochloric Acid
Oxygen
Membrane Filters
Weighing Bottle, 60mL
Drying Oven
Vacuum Source
Flushing Tube
Rubber Policeman

Oxidation Characteristics of Extreme Pressure Lubricating Oils ..... Pages 119-122

ASTM D2893

Drying Tower
Chromic Acid or equivalent detergent cleaning solution
Air Supply

Oxidation Stability of Mineral Insulating Oils ..... Page 123

ASTM D2440

n-Heptane
Potassium Hydroxide Solution
Isopropyl Alcohol
Acid Free Filter Paper
Oxygen
Toluene
Chloroform
p-Naphtolbenzein Indicator

Oxidation Stability of Inhibited Mineral Turbine Oils ..... Page 126

IP 280

Oxygen
Phenolphthalein
Hydrochloric Acid
Toluene
Ethanol
Membrane Filters
Burette
Filtration Apparatus
Alkali Blue Indicator
Heptane
Potassium Hydroxide
Dichloromethane
Sulfuric Acid
Evaporating Dish
Air Oven
Conical Flask, 500mL

Oxidation Stability of Straight Mineral Oil ..... Page 126

IP 306

Filtering Crucibles
Burette
Alkali Blue Indicator
n-Heptane
Potassium Hydroxide
Chloroform
Sulfuric Acid
Membrane Filters
Petri Dishes
Oven
Porcelain Crucibles
Oxygen
Phenolphthalein
Hydrochloric Acid
Toluene
Ethanol
Acetone
Forceps
Filtration Apparatus
Isopropanol

Additional Accessories (Continued)

Oxidation Stability of Mineral Insulating Oil .....Page 126

IP307

Filtering Crucibles
Burette
Alkali Blue Indicator
Heptane
Potassium Hydroxide
Chloroform
Sulfuric Acid
Isopropanol
Forceps
Filtration Apparatus
Porcelain Crucibles
Oxygen
Phenolphthalein
Hydrochloric Acid
Toluene
Ethanol
Acetone
Membrane Filters
Petri Dishes
Oven

Oxidation Stability of Inhibited Mineral Insulating Oils .....Page 126

IP 335

Porcelain Crucibles
Oxygen
Phenolphthalein Solution
Hydrochloric Acid
Toluene
Ethanol
Forceps
Filtration Apparatus
Sulfuric Acid
Isopropanol
Burette
Alkali Blue Indicator
n-Heptane
Potassium Hydroxide
Chloroform
Membrane Filters, 5.0 µm
Petri Dishes
Oven
Acetone

Thermal Oxidation Stability of Automotive Gear Lubricants .....Page 127

ASTM 5704; STP12A L-60-1 Performance Test (formerly CRC L-60 Test); FTM 791B Method 2504

Oakite 811
Stoddard Solvent
Reference Oils
Absorbent Cotton
Heptane
Pentane
Toluene
Air Supply
Tweezers
Organic Cleaning Solvent

Corrosiveness and Oxidation Stability of Hydraulic Oils, Aircraft Turbine Engine Lubricants and Other Highly Refined Oils.....Pages 124-125

ASTM D4636; FTM 791-5307, FTM 791-5308; IHC BT-10, DIN 51394

Air Supply
Analytical Balance
Centrifuge and Tubes
Microscope
Oven (optional)
Forceps
Sodium Dichromate
Brush
Nochromix
Cotton
n-Heptane
Acetone
Nitric Acid
Sodium Hydroxide
Sodium Phosphate
Sulfuric Acid
Distilled Water

Rust Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water (Standard and Horizontal Disc Methods) .....Pages 128-129

ASTM D665, D3603; NACE TM-01-72; IP 135; ISO 7120; DIN 51355, DIN 51585; FTM 791-4011, 791-5315

Oven
Isooctane
Distilled Water
Petroleum Spirit 60/80
Naphtha
Synthetic Sea Water
Precipitation Naphtha

Corrosion of Lead by Lubricating Oils.....Page 130

FTM 791-5321.1

Air Supply
Forceps
Acetone
Cotton
Analytical Balance
Petroleum Naphtha
Steel Wool

Bearing Compatibility of Turbine Oils .....Page 131

FTM 791-3452

Test Equipment for:
- ASTM D445 Kinematic Viscosity (refer to Viscosity Section)
- ASTM D524 Ramsbottom Carbon Residue (refer to Page 53)
- ASTM D974 Total Acid Number

Copper Corrosion From Petroleum Products.....Page 131

ASTM D130

Filter Paper
Isooctane
Stoddard Solvents
Cotton Wool
Stainless Steel Forceps

Cloud Point and Pour Point of Petroleum Oils.....Pages 132-133

ASTM D97, D2500; IP 15, 219; ISO 3015, 3016; DIN 51597; FTM 791-201

Methanol
Solid Carbon Dioxide
Calcium Chloride
Ethanol
Sodium Sulfate
Petroleum Naphtha
Acetone
Sodium Chloride

Coking Tendency of Oil .....Page 135

FTM 791-3462

Emery Paper
Petroleum Ether

Evaporation Loss of Lubricating Oils (Noack Test) .....Page 136

ASTM D5800; DIN 51581; IP 421

Balance
Toluene
Naphtha

Tribology

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Four Ball Wear and EP

K93100 Four Ball Tester

Tribology (Friction and Wear) Testing of Lubricants
Friction and Wear Test Equipment

Koehler Instrument Company is pleased to offer advanced equipment for a variety of friction and wear tests. Several of the standard instruments that we offer are listed here. Please contact us to discuss your requirements for these as well as custom-designed units for tribology analysis methods. Our applications personnel will consult with you on your requirements and work with our design staff to provide solutions for your tribology testing needs.

Test Method

Determines the Wear Preventative (WP) and Extreme Pressure (EP) characteristics of lubricating oils and greases in sliding steel-on-steel applications. The test consists of rotating a steel ball under load against three stationary steel balls coated with lubricant. Measurements are taken at the rotating speeds, temperatures, and duration as specified by published standards. The load-wear index can be calculated from the weld point in EP tests, and lubricant comparisons can be made based upon scar diameters incurred from wear tests.

Four Ball Wear and EP Tester

- Conforms to ASTM D2266, D2596, IP 239, and related specifications
- Performs Wear Preventative (WP) and Extreme Pressure (EP) tests
- Displays and records normal load, frictional torque, time, and temperature
- Test speeds and temperatures are electronically controlled
- Data Acquisition Software and Card are included
- Custom configurations are available
- Precise variable loading capability*

Four Ball Tester performs both Wear Preventative (WP) and Extreme Pressure (EP) analyses for measuring the wear and frictional properties of lubricants under sliding steel-on-steel test conditions. Tests are performed in accordance to the latest ASTM and IP published methods. Normal load on the ball assembly and frictional torque are measured through load cells. Data is processed and stored utilizing TriboDATA, an advanced data acquisition and processing software package. Test results can be plotted and compared, as well as exported to other programs. Wear scars on the steel balls are measured and recorded with a High Resolution Digital Microscope available as recommended accessory for the Four Ball Tester.

High Resolution Digital Microscope

Koehler's Four Ball Microscope is a versatile device for measuring the wear scar diameter on a steel test ball. This apparatus consists of the "Dinolite" Microscope with "DinoCapture" Software mounted at an angle on an aluminum base. The device is designed to measure the wear scar without removing the test balls from the ball pot allowing for a safer measurement procedure. The wear scar can be viewed through an external PC. The software measures the wear scar using a diameter and line tool. The images can be saved at varied resolutions on a PC.

Specifications

Conforms to the specifications of:
ASTM D2266, D2596, D2783, D4172, D5183*, IP 239
Electrical Requirements: CE
220V, 60Hz, 3 phase
440V, 50Hz, 3 phase
Drive Motor: 1.5 kW
Test Speeds: 1200, 1440, 1760 rpm
Optional Test Speeds (min/max): 1000/3000, 300/3000 rpm
Maximum Axial Load: 10000 N at 3000 rpm or 12000 N at 1800 rpm
Test Duration (min/max): 1/9999 min
Test Ball diameter: 12.7 mm

Shipping Information

Shipping Weight: 1360 lbs (620 kg)
Dimensions: 45 Cu. ft.

**Pneumatic option required*
IP300 or CEC-L-45-A-99 units available.
Please contact Koehler Customer Service for additional information.

Included Accessories

Set of Weights
Ball Chucks
Ball Pot
Ball Chuck Remover
Ball Rack
Ball Clamp Ring
Ball Holder Base Disc
Set of Hand Tools
Torque Wrench
Electrical Controller
Connecting Cables
TriboDATA Software
Calibration and Test Reports

Ordering Information

Catalog No.		Order Qty
K93100	Four Ball Tester, 220V 60Hz	1
K93100-PN	Four Ball Tester with pneumatic loading, 220V 60Hz	
K93190	Four Ball Tester, 380V 50Hz	1
K93190-PN	Four Ball Tester with pneumatic loading, 380V 50Hz	

Accessories

K93105	Test Balls (Pack of 100)
K93111	High Resolution Digital Microscope

Tribology Data Acquisition System

TriboDATA Data Acquisition System

- Powerful data acquisition system provides analog to digital conversion and data analysis of test results for many tribology instruments available from Koehler as well as ***other tribology instrument manufacturers***
- Real-time display of critical test parameters such as normal load, friction force, temperature, and time

The Koehler TriboDATA System is designed to acquire and process analog data from the various tribology test instrumentation offered from Koehler as well as from *other tribology instrument manufacturers*. The analog-to-digital converter card is comprised of four analog inputs, and the test data is recorded and displayed in real-time. Up to four graphs can be displayed simultaneously. The data can be stored to disk for future reference or exported in an ASCII text format to other software packages. Critical test parameters are also saved with the data. With the TriboDATA hardware and software package, data acquisition of crucial test parameters such as normal load, friction load, temperature, and time can be seamlessly performed to ensure that your test results are consistent and repeatable within prescribed test conditions. As an option, a CCD camera package is available to capture wear scar images and store them on a PC for analysis.

Computer Requirements

Processor: Pentium or higher
Processor Speed: 100 MHz or higher
Operating System: Windows® 95/98/NT
Memory (RAM): 16 Mb
Required Disk Space: 10 Mb
One Free Expansion ISA Slot

Included Accessories

Software on CD
Acquisition Data Card
Connection Cable
Instruction Manual

K93900 TriboDATA Data Acquisition System

Ordering Information		
Catalog No.		**Order Qty**
K93900	TriboDATA Data Acquisition System	1

High Frequency Reciprocating Rig

Test Method

A 2-mL test specimen of fuel is placed in the test reservoir and maintained at 25 or 60°C. When the temperature has stabilized, a vibrator arm holding a nonrotating steel ball and loaded with a 200-g mass is lowered until it contacts a test disk completely submerged in the fuel. The ball is caused to rub against the disk with a 1-mm stroke at a frequency of 50 Hz for 75 min. The ball is removed from the vibrator arm and cleaned. The dimensions of the major and minor axes of the wear scar are measured under magnification and recorded.

High Frequency Reciprocating Rig

The two-station Fuel Lubricity Wear Test Machine incorporates two test positions with heater pads and mounting arrangements for fuel lubricity test specimens. Load is applied manually by means of dead weights directly to the fixed ball specimen carrier by means of a loading yoke. Machine controls are limited to speed control of the drive motor to give the required frequency, temperature control of the specimen bath and test duration. Test data is limited to post test wear scar measurement only and no facilities are provided for friction force measurement.

Electrical Requirements CE

115V 60Hz, Single Phase
230V 50/60Hz, Single Phase

Ordering Information	
Catalog No.	
K93450	High Frequency Reciprocating Rig, 115V 60Hz
K93459	High Frequency Reciprocating Rig, 230V 50/60Hz

K93450 High Frequency Reciprocating Rig (HFRR)

Specifications

Test specifications: ASTM D6079; ISO 12156
Contact Geometry: Ball on Plate
Ball Specimen: 6 or 10 mm diameter
Load: 1.95 to 10.00 N (± 0.01 N)
Stroke: 1 mm (± 0.02 mm)
Frequency: 2.5 to 50 Hz (± 1 Hz)
Fluid Volume: 2 mL (± 0.2 mL)
Test Temperature: 25 or 60°C (± 2°C)
Test Duration: 75 min (± 0.1 min)
Bath Surface Area: 6 cm2

Koehler INSTRUMENT COMPANY, INC.

Pin-On-Disc

K93500 Pin-On-Disc Tester

Specifications for Pin-On-Disc with Environmental Chamber & Lubricant Recirculating System

Temperature: 60°C Maximum
Discharge Rate: 0-1 L/min
Viscosity Range: 90 SAE Maximum
Capacity: 3L of Lubricant

Shipping Information

Shipping Weight: 440 lbs (200 kg)
Dimensions: 18 Cu. ft.

Included Accessories

Electrical Controller Unit
Connecting Cables
Spare Fuses
TriboDATA Software
Set of Weights
Set of Hand Tools
Set of Pins
Calibration and Test Reports

Electrical Requirements CE

115V 60Hz
230V 50/60Hz

Ordering Information

Catalog No.		Order Qty
K93500	Pin-On-Disc Machine, 115V 60Hz	1
K93590	Pin-On-Disc Machine, 230V 50Hz	

Optional Configurations Available

Environmental Chamber
Lubricant Recirculating System
Environmental Chamber and Lubricant Recirculating System

High temperature models (up to 700°C) are available. Please contact Koehler Customer Service for additional information.

Pin-On-Disc Tester

- Conforms to ASTM G99 standard test method
- Analyzes wear and friction characteristics of sliding contacts (dry or lubricated conditions)
- Tests can be performed on a variety of materials: metals, polymers, composites, ceramics, lubricants, cutting fluids, abrasive slurries, coatings, and heat-treated samples
- TriboDATA software package varies and records pin pressure, pin temperature, sliding speed, and lubrication parameters
- Custom configurations available

The Pin-On-Disc machine is a versatile unit designed to evaluate the wear and friction characteristics on a variety of materials exposed to sliding contacts in dry or lubricated environments. The sliding friction test occurs between a stationary pin stylus and a rotating disk. Normal load, rotational speed, and wear track diameter can be varied. Electronic sensors monitor wear and the tangential force of friction as a function of load, speed, lubrication, or environmental condition. These parameters as well as the acoustic emissions at the contact are measured and displayed graphically utilizing the TriboDATA software package.

Specifications

Conforms to the specifications of: ASTM G99

Sliding Speed Range:	0.26-10 m/sec
Disc Rotation Speed:	100-2000 rpm
Maximum Normal Load:	200 N
Frictional Force:	0-200 N
Wear Measurement Range:	4 mm
Pin Size:	3-12 mm diagonal/diameter
Disc Size:	160 mm diameter x 8 mm thick
Wear Track Diameter:	10-140 mm

Timken Testers

Timken Mechanical Tester

A steel test cup rotating at 800 RPM is pressed against a steel test block. Sample under test is carried by the test cup into the sliding contact. Test load at the contact is progressively increased, score value and OK value are determined.

Test Method

This tester is used to measure extreme pressure properties of lubricating grease and lubricating fluids.

Specifications

Conforms to the specifications of:
ASTM D 2509 - IP 326 for greases.
ASTM D 2782 - IP 240 for lubricating fluids.
Rate of loading : 0.9 to 1.3 Kg/sec.
Grease feed rate : 45 ± 9 g / min.
Fluid feeder : 3.8 liter with recirculating pump and heater.
Motor : 1.5 kW with variable frequency drive.
Power : 220V 60Hz, 380V 50Hz, 5 KVA max. CE

Included Accessories

- Calibration kit for load and RPM
- Set of tools for operation
- Microscope for scar measurement
- Electronic timer

K92000 Timkin Tester

Timken Pneumatic Tester

A steel test cup rotating at 800 RPM is pressed against a steel test block. Sample under test is carried by the test cup into the sliding contact. Test load at the contact is progressively increased, score value and OK value are determined.

Test Method

This tester is used to measure extreme pressure properties of lubricating grease and lubricating fluids.

Features & Benefits

• Loading is pneumatic. Frictional torque is measured with a torque cell.

Specifications

Conforms to the specifications of:
ASTM D 2509 - IP 326 for greases.
ASTM D 2782 - IP 240 for lubricating fluids.
Rate of loading : 0.9 to 1.3 Kg/sec.
Grease feed rate : 45 ± 9 g / min.
Fluid feeder : 3.8 liter with recirculating pump and heater.
Motor : 1.5 kW with variable frequency drive.
Power : 220V 60Hz, 380V 50Hz, 5 KVA max. CE

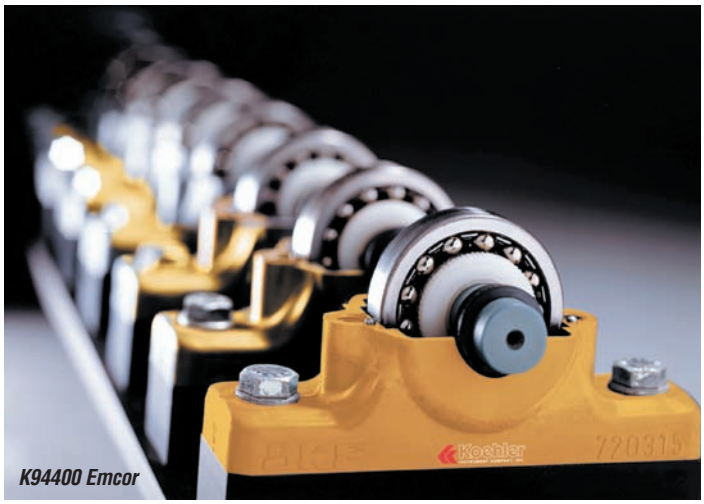
Included Accessories

- Calibration kit for load and RPM
- Vibration sensor
- Microscope for scar measurement
- Set of tools for operation
- Electronic timer

Ordering Information

Catalog No.	
K92000	Timken Tester, 220V 60Hz
K92000-PN	Timken Tester with pneumatic loading, 220V 60Hz
K92090	Timken Tester, 380V 50Hz
K92090-PN	Timken Tester with pneumatic loading, 380V 50Hz

Corrosion Inhibition Properties of Greases



K94400 Emcor

Test Method

Measures the ability of a grease to protect a bearing against corrosion in the presence of water. Two sets of grease-coated bearings per station are partially immersed in water and rotated at a speed of 80 rpm in a sequence of running and resting periods. At the end of the test, the raceways of the bearing outer rings are inspected for rust.

Emcor Grease Testing Machine

- Evaluates the rust preventive properties of greases and oils
- Performs both standing and dynamic testing

The Emcor Grease Testing Machine evaluates the rust preventive properties of greases on bearing components, measuring the ability of a grease to protect a bearing against corrosion in the presence of water. As bearings are normally used in environments exposed to humidity and temperature variations, condensation may form on the bearing thus promoting the onset of rust. Rust is detrimental to proper bearing operation and will compromise the longevity of the bearing. A good quality grease should be designed to protect the bearing from rust and corrosion under these conditions.

The Emcor system features test method versatility, since both greases and oils can be tested as well as variations can be made with regard to the test medium (e.g., brine instead of water). The costs for running these tests are minimal. The two test bearings are the only machined parts that have to be renewed for each test, and the polyamide material for the housing is rigid and strong and rarely ever needs replacement.

Ordering Information

Catalog No.		Order Qty
K94400	Emcor Grease Testing Machine, 115V 60Hz	1
K94490	Emcor Grease Testing Machine, 230V 50Hz	
	Accessories	
K94401	Test Bearing	8
K94402	Mounting Sleeve	8
K94403	Mounting Nut	8
K94408	Mounting Tool	1
K94410	Filling Device for Test Bearings	1
K94490-1	Emcor Washout Test Option *Includes: Peristaltic Pump, Overflow Container, Inlet and Outlet Tubing and Pipe Fittings*	1

Specifications

Conforms to the specifications of:
ASTM D6138; IP 220; ISO 11007; DIN 51802; NFT 60-135; SIS 155130
Electrical Requirements: CE
115V, 60Hz, 1 phase
230V, 50Hz, 1 phase

Dimensions lxwxh,in.(cm)

48½x15x11 (123x38x28)
Net Weight: 88 lbs (40kg)

Shipping Information

Shipping Weight: 121 lbs (55 kg)
Dimensions: 8 Cu. ft.

Scratch Tester

Specifications

Normal load control range: 2 - 20N
Normal load accuracy: 1% or 10mN
Tangential force measurement range: 2 - 20N
Tangential force accuracy: 1% or 10mN
Stroke (X): 0.1 - 50mm
Speed: 0.1 - 5mm/s
Pitch(Y): 0.2 - 50mm
Loading Rate: 0 - 20N/s. In steps of 0,2,5,10,15,20N/s
Sample Size (LxWxT): 60x60x10mm
Operating Temperature: 15 - 40°C. RH: 25 - 85%
Storage Temperature: -10 - 40°C, RH: 0 - 90%
Electrical Requirements: CE
115V 60Hz
220V 50Hz

Included Accessories

Control Box
Reference Sample (2)
Tool Kit
Diamond Indenter
Data Acquisition Software
Operating and Instruction Manual

Dimensions lxwxh,in.(cm)

11.81x10.83x21.65 (30x27.5x55)
Net Weight: 44.1lbs (20kg)

Scratch Tester

The Scratch Tester is a versatile instrument capable of quantifying scratch resistance, critical load, adhesion and bond strength for a wide range of surfaces. The tester evaluates scratch resistance of a sliding surface in relative motion (X movement) to a stylus. The stylus is pressed against the moving surface with controlled force which is normal to the surface. Tangential force at the contact is measured. The ratio of tangential and normal forces is merely the co-efficient of friction till the threshold of surface damage. Energy required to damage the surface contributes an additional component to the tangential force, which increase this ratio. Force ratio is not the only sign of damage - acoustic emission level also increases corroborating the occurrence of surface damage. Image of the entire scratch may be captured and the view at any given load can be seen to study nature of failure.

Ordering Information

Catalog No.	
K93000	Scratch Tester, 115V 60Hz
K93090	Scratch Tester, 220V 50Hz
	Accessories
K93004	CCD Based Image Acquisition System
K93016	Acoustic Emission Sensor

Pin and Vee Block Tester

Test Method

To evaluate wear preventative and load carrying properties of fluid lubricants, and endurance (wear) life of film lubricants.

Pin and Vee Block Tester

- Automatic Start of Test at Set Temperature
- Over-Temperature and Over-Torque Protection
- Maintenance of Test Speed within Specified Limits over entire Load Range
- Calibration kit for Load, Torque, and Wear
- High Performance Sensor to cover entire test load range with single load cell with adequate resolution.

The Pin and Vee Block Tester consists of a rotating pin pressed between two stationary steel Vee blocks. Load is applied to the Vee blocks by a ratchet mechanism. Ramping of load during extreme pressure testing is made possible by auto advancement mechanism of ratchet. Pin and Vee blocks are immersed in lubricant fluid under test in heated test cup. Wear, torque and endurance life is evaluated accordingly. The Pin and Vee Block tester comes with data acquisition software. Test torque, load, temperature and wear are measured and recorded. The software permits users to view, compare and report various test results.

K95190 Pin and Vee Block Tester

Specifications

Conforms to the Specifications of:
ASTM D2625, D2670, D3233, D5620;
FTM 791C-3807.1, FTM 791C-3812.1
Test Load: 0 to 4500 lbf
Torque: 0 to 100 in-lb
Speed: 100 to 500 RPM
Temperature: Ambient to 200°C
Duration: 0 to 999.9 minutes
Electrical Requirements: CE
230V, 50/60Hz, 2 KVA, 1 Phase

Included Accessories

Calibration Kit	Measuring Microscope
Data Acquisition Software	Steel Ruler, 6”
Brinell Ball Attachment	Dust Cover
Test Pin (50)	Shear Pin (50)
Vee Block (100)	

Ordering Information

Catalog No.	
K95190	Pin and Vee Block Tester, 230V 50/60Hz

Measurement of Lubricity of Aviation Turbine Fuels by the Ball-on-Cylinder Lubricity Evaluator (BOCLE)

Test Method

Covers the Assessment of the wear aspects of the boundary lubrication properties of aviation turbine fuels on rubbing steel surfaces.

Data Acquisition

Test parameters such as speed, test duration, fuel temperature, air temperature and humidity are acquired, displayed and recorded. The acquired data can be viewed in graphs. The data acquisition system provides the users with the facility to super impose up to four test graphs for comparative viewing.

Specifications

Conforms to the Specifications of: ASTM D5001
Motor Speed: 240 ± 0.5 RPM
Fuel Temperature Control: 25±1.0 max, 0.1°C typical
Flow Rate: 3.8 ± 0.1 L/min
Relative Humidity: 10.0 ± 0.2% indicated
Temperature: 25±1.0 max, 0.1°C typical
Fuel Conditioning: 15 min ± 0.1s
Test Duration: 30 min ± 0.1s
Ambient Temperature: 15 to 22°C
Electrical Requirements: 230V, 50Hz, 2 KVA, 1 Phase, 1.5 KVA Max. CE

ATF Lubricity Test Rig (BOCLE)

The instrument consists of a rotating test ring against which a fixed test ball is pressed with the required force. A fuel bath containing the fuel under test is placed on – movable stage under the test ring. The temperature is controlled and the air is conditioned.
Fuel under test is conditioned by maintaining the fuel temperature at 25°C maintained at 25°C with 10% Relative Humidity is passed through the test area which is enclosed.
After conditioning of the fuel, a test ball of 12.7 mm diameter is pressed against the outer surface of the test ring. The lower part of the test ring is immersed in the test fuel bath.
The test ball is pressed with a force of 10 N against the test ring. The test ring is made to rotate at 240 RPM for a period of 30 minutes after which the test stops.
The wear scar on the test ball is studied and the scar diameters of the wear scar (major and minor axis) are measured.

Ordering Information

Catalog No.	
K94190	ATF Lubricity Test Rig (BOCLE), 230V 50Hz

Koehler INSTRUMENT COMPANY, INC.

Multispecimen

Multispecimen Tester

- Multiple test configuration for wear and friction monitoring in one unit
- Speeds variable to 2000 rpm and loads to 1000 N
- Data acquisition system records speed of rotation, normal load, sample temperature, and frictional torque

Measures and displays a variety of friction and wear characteristics on various geometric test samples with different compositions and forms. Test configurations are easy to change on the instrument: single or multiple, sliding or rolling, point, line or area contacts are available. A wide range of materials including coatings, lubricants, plastics, metals, polymers, ceramics, and composites can be readily analyzed. The test is performed by mounting a test sample into the spindle and rotating it against a stationary counter-face test specimen. The spindle rotation speed, normal load, and interface temperature can be user-adjusted in accordance with published ASTM standards. Specimen holders are designed for standard test configurations; optional custom designed holders for customer specific applications are also available. This unit has a temperature range to 120°C, load to 1000 N and speed up to 2000 rpm. Windows®-based TriboDATA data acquisition software is included, and some of the possible configurations are shown in the table to the right.

Specifications

Conforms to the specifications of:
ASTM D2266, D3702, D4172
Normal Load: 5-1000 N
Frictional Torque Measurement Range: 0-10 Nm
Shaft Speed: 200-2000 rpm
Wear Measurement: 0-2000 µm
Non-Rotating Sample Diameter/Diagonal: up to 80 mm
Pin Sample Diameter: up to 8 mm
Ball Diameter: 12.7 mm
Non-rotating Sample Temperature: Ambient to 100°C

Configurations Table	
Ball on flat Sliding point contact	1, 2, 3 balls can be used Dry or lubricated contact
Cylinder on flat Sliding line contact	1 or 2 pins. Dry or lubricated
Pin on flat Sliding area contact	1, 2 or 3 pins. Dry or lubricated
Four ball wear Wear preventive properties of lubricants	ASTM D2266 ASTM D4172
Thrust washer Rotating washer against fixed washed with axial load	ASTM D3702

Ordering Information		
Catalog No.		**Order Qty**
K93600	Multispecimen Tester, 220V 60Hz 3 Phase	1
K93690	Multispecimen Tester, 380V 50Hz 3 Phase	

Included Accessories

Electrical Controller
Electrical Cables
TriboDATA Software
Set of Hand Tools
Calibration and Test Reports

Electrical Requirements CE

220V 60Hz 3 Phase
380V 50Hz 3 Phase

Included Adapters

Ball on Flat
Cylinder on Flat
Pin on Flat
Four Ball Wear Preventative
Thrust Washer

Shipping Information

Shipping Weight: 880 lbs (400 kg)
Dimensions: 32 Cu. ft.

Tribology Test Specimens and Other Tribology Equipment

Slurry Abrasion Tester

Measures the slurry abrasive resistance of solid materials as prescribed by ASTM G105 specifications. Performs tests on metals, minerals, polymers, composites, ceramics, coatings, and heat-processed materials. A rectangular test sample is rotated in a slurry cup with the temperature maintained using a water bath. The test speed, temperature, duration, sample size, and slurry composition can be varied. The differential mass of the sample before and after the test is converted to volume loss (abrasion index) for direct comparison of the tested materials.

Tapping Torque Tester

Evaluates metal working fluids and various machining operations according to ASTM D5619 for the the torque requirements of tapping operations in pre-drilled samples. Software package acquires cutting torque and rotational speed and displays them as a function of test duration or angle of tool rotation.

Air Jet Erosion Tester

Performs air jet erosion test according to ASTM G76 specifications. A test sample is bombarded by a gas containing particulates with a known velocity and concentration of particles. Comparison can be made by varying test sample composition, size, particle velocity, angle of incidence, and temperature.

Dry Abrasion Tester

Measures index of abrasive resistance to dry sand according to ASTM G65 test specifications. Test specimen is held against a rotating wheel and abraded with a grit of controlled size, composition, and flow with the proper test duration and applied force as prescribed by the ASTM test method. The differential mass of the specimen before and after the test is recorded and converted to volume loss (abrasion index) for direct comparison of tested materials.

Custom-Built Tribology Test Equipment and Test Specimens

Test specimens are available for all of the tribology instrumentation offered from Koehler. Please inquire with customer service about other custom-built tribology test equipment and test specimens.

Custom-designed equipment is readily available for the following tribology test methods:

Universal Wear (ASTM G77, G99)
Vane Pump Wear (ASTM D2882)
Shear Stability (ASTM D6278)
Slurry Erosion Tester
Reichert Tester
Grease Life Tester (D3336)
Grease Noise Tester
V2F Grease Testing Machine
ROF Grease Testing Machine (DIN 51806)
R2F Grease Testing Machine

High Temperature Air Jet Erosion Tester

Lubricating Greases

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For information on additional test methods for lubricating greases:

–Please refer to the Penetration Section

–Additional test methods are available upon request

–please call or write for information

Evaporation Loss of Lubricating Greases and Oils

K29500 Evaporation Test Cell with Grease Cup

Specifications

Conforms to the specifications of:
ASTM D972, D2878; IP 183; FTM 791-351
Capacity: 2 oil or grease samples
Maximum Temperature: 350°F (177°C)
Temperature Control Stability: ±1°F (± 0.5°C)
Circulation: 1/20hp stainless steel impeller
Bath Medium: 5.3 gal (20L) high temperature transfer fluid
Electrical Requirements:
115V 60Hz, Single Phase, 8.6A
220-240V 50/60Hz, Single Phase, 4.5A

Included Accessories

Support Clamps (2)
Thermometer Holder

Dimensions

33w" x 25½"h (84x65cm)
Maximum width with two evaporation cells inserted
Net Weight: 62 lbs (28.1kg)

Shipping Information

Shipping Weight: 90 lbs (40.8kg)
Dimensions: 14.2 Cu. ft.

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Test Method

Evaluates the potential for evaporation loss of lubricant components in high temperature service. A controlled flow of heated air is passed over the sample for a specified period. Evaporation loss is measured by the change in sample weight during the test. The Evaporation Loss test can also be used for Estimating Apparent Vapor Pressures and Molecular Weights of Lubricating Oils (ASTM D2878). A high temperature version of the Evaporation Loss test is available (See ASTM D2595).

Evaporation Loss Tester

- Conforms to ASTM D972, D2878 and related specifications
- Two-sample testing capability

Evaporation Cell–Suitable for evaporation loss tests on lubricating greases and oils in the temperature range of 210 to 300°F (99 to 149°C). Passes heated air over the sample at the required flow rate. Consists of stainless steel body, cover, eduction tube and hood. Calibrated flowmeter with needle valve maintains 2L/min. air flow at standard temperature and pressure. Supplied with stainless steel grease or oil sample cup. Sample cups are interchangeable. Entire assembly mounts in Evaporation Loss Test Bath.

Evaporation Loss Test Bath–Constant temperature oil bath mounts two Evaporation Cells in an upright position at the proper immersion level. Maintains test temperature within ±1°F (±0.5°C). Microprocessor PID control provides quick temperature stabilization without overshoot and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Fully insulated, double-wall construction, with stainless steel tank and polyurethane-finished steel exterior.

**Also available–special bath to accommodate both ASTM D972 and D942 (Oxidation Stability of Greases on page 152) test methods. Please contact Koehler for additional information.*

Ordering Information

Catalog No.		Order Qty
K29400	Evaporation Loss Test Bath, 115V 60Hz	1
K29490	Evaporation Loss Test Bath, 220-240V 50/60Hz	
K29500	Evaporation Test Cell with Grease Cup	2
K29550	Evaporation Test Cell with Oil Cup	

Accessories

250-000-22F	ASTM 22F Thermometer Range: 204 to 218°F
250-000-22C	ASTM 22C Thermometer Range: 95 to 103°C
250-000-67F	ASTM 67F Thermometer Range: 203 to 311°F
250-000-67C	ASTM 67C Thermometer Range: 95 to 155°C
K29530	Oil Sample Cup with Hood
K29540	Grease Sample Cup with Hood

Evaporation Loss of Lubricating Greases Over Wide Temperature Range

Test Method

Similar to the ASTM D972 Evaporation Loss test, extending the temperature range for evaporation loss testing to 600°F (316°C).

High Temperature Evaporation Loss Tester

- Conforms to ASTM D2595 specifications
- Microprocessor temperature control with digital display and overtemperature cut-off
- Microprocessor programmable high accuracy temperature control

Performs evaporation loss tests on lubricating greases at temperatures of up to 600°F (316°C). Maintains sample temperature within ±0.3°F while passing heated air over the sample surface at a controlled flow rate. Consists of evaporation cells and aluminum block oven with controls for sample temperature, air temperature and air flow rate. Evaporation cells include grease sample cup, head, eduction tube, cover and thermocouple tube. Aluminum block oven provides efficient response and safe operation at high temperatures. Microprocessor temperature control has °C/°F switchable digital setpoint and display. Operator and equipment are protected by an overtemperature control circuit which automatically interrupts power to the unit when bath temperature exceeds a programmed cut-off point. Microprocessor PID control provides quick temperature stabilization without overshoot and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Separate air preheater controls and flowmeters for each cell permit accurate control of heated air flow to sample surface. Order accessory Digital Thermometer (Cat. No. K29310) to monitor exit air temperature and ASTM 3F or 3C Thermometer for block (sample) temperature. Accessory oil sample cup (Cat. No. K29530) converts evaporation cell for lubricating oil samples.

Ordering Information

Catalog No.		Order Qty
K29300	High Temperature Evaporation Loss Tester, 220-240V 50/60Hz	1
	Accessories	
K29320	High Precision Digital Thermometer, 115V 60Hz Microprocessor based digital thermocouple thermometer with ten channel input. Monitors Type K Thermocouples from evaporation cells in K29300 Evaporation Loss Tester. Use together with preheater controls in Model K29300 to maintain air temperature within ±1.1°C (±2°F) per ASTM specifications	1
K29329	High Precision Digital Thermometer, 220-240V 50/60Hz	
250-000-03F	ASTM 3F Thermometer Range: 20 to 760°F	
250-000-03C	ASTM 3C Thermometer Range –5 to +400°C	
K29530	Oil Sample Cup with Hood	
K29540	Grease Sample Cup with Hood	

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

K29300 High Temperature Evaporation Loss Tester

Specifications

Conforms to the specifications of:
ASTM D2595, D2878*
*with accessory oil sample cup installed
Capacity: 2 samples
Temperature Range: 200 to 600°F (93 to 316°C)
Sample Temperature Control:
Type: microprocessor digital control
Exit Air Temperature Control: Two 0-500W variable control heaters and type K thermocouples (order K29320/K29329 Digital Thermometer separately)
Air Flow Control: Two externally mounted flowmeters maintaining 2L/min flow at standard temperature and pressure
Electrical Requirements: CE
220-240V 50/60Hz, Single Phase, 10.4A

Included Accessories

Evaporation Cell Assemblies with grease sample cups (2)
Type K Thermocouples (2)

Dimensions lxwxh,in.(cm)

25x16x17 (64x41x43)
Net Weight: 175 lbs (79.4kg)

Shipping Information:

Shipping Weight: 224 lbs (101.6kg)
Dimensions: 10.4 Cu. ft.

Koehler INSTRUMENT COMPANY, INC.

Dropping Point of Lubricating Grease

K19490 Dropping Point Apparatus

Ordering Information

Catalog No.		Order Qty
K19490	Dropping Point Apparatus,115V 60Hz	1
K19491	Dropping Point Apparatus, 220-240V 50/60Hz	

Accessories

250-000-02F	ASTM 2F Thermometer. Range: 20 to 580°F	2
250-000-02C	ASTM 2C Thermometer. Range: –5 to +300°C	
K194E7	Cup Plug Gauge Checks conformity of test cup with specifications. Per Fig. 1, ASTM D566 and Fig. 1-E7, ASTM D2265	1
K194E6	Polished Metal Rod	
K194EA	Grease Cup	
K19492	Test Tube with indentations	
K19493	Thermometer Cork	
K19499	Cork Ring Guide	

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Test Method

Dropping point determinations are used for identification and quality control purposes, and can be an indication of the highest temperature of utility for some applications. The sample is heated at a prescribed rate in a precision machined cup whose sides slope toward an opening at its center. The temperature at which a liquid drop first falls from the cup is the dropping point of the sample.

Dropping Point Apparatus

- Conforms to ASTM D566, D4950 and related specifications

Performs dropping point determinations on lubricating greases at temperatures of up to 550°F (288°C). Consists of dropping point cup, test cell with accessories and oil bath with stirrer and heater. Test cell is immersed in a 400mL Borosilicate Glass bath for heating at the prescribed rate. A 750W variable stepless control heater and ¹⁄₄₀hp stirrer permit accurate, uniform control of bath temperature rate of rise. Heater assembly includes refractory top plate and reference dial.

Specifications

Conforms to the specifications of:
ASTM D566, D4950; IP 132; ISO 2176; DIN 51801; FTM 791-1421; NF T 60-102
Maximum Temperature: 550°F (288°C)
Bath Medium: A high temperature heat transfer fluid having a flash point in excess of 400°C is recommended. Silicone fluid (P/N 355-001-002 — page 8) is suitable.
Electrical Requirements: CE
115V 60Hz, Single Phase, 6.5A
220-240V 50/60Hz. Single Phase, 3.4A

Included Accessories

Grease Cup, chromium plated brass
Test Tube with indentations
Cork Ring Guide
Thermometer Corks (2)
Thermometer Depth Gauge
Polished Metal Rod
Connecting Hardware

Dimensions lxwxh,in.(cm)

5x5x31(13x13x78)
Net Weight: 11 lbs (5.0kg)

Shipping Information

Shipping Weight: 16 lbs (7.3kg)
Dimensions: 2.8 Cu. ft.

Dropping Point of Lubricating Grease Over Wide Temperature Range

Test Method

The ASTM D2265 dropping point test permits higher temperatures than the ASTM D566 method and uses a different heating procedure: the test cell is inserted in an aluminum block oven maintained at a constant temperature that is higher than the expected dropping point of the sample. The sample temperature then rises to the dropping point without operator control.

High Temperature Dropping Point Apparatus

- Conforms to ASTM D2265 and D4950 specifications
- Six-sample testing capability
- Microprocessor programmable high accuracy temperature control

Tests dropping points of lubricating greases at temperatures of up to 400°C (752°F). Includes thermostatically controlled aluminum block oven and six complete dropping point assemblies. Six-place oven has large viewing ports with fluorescent backlighting for excellent visibility. Microprocessor PID control provides quick temperature stabilization without overshoot and the bath is protected by an overtemperature control circuit that interrupts power should block temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Microprocessor temperature control with digital readout and overtemperature safety cut-off maintains block temperature with ±0.5°C stability. Insulated cabinet has a chemical resistant polyurethane finish.

K19400 High Temperature Dropping Point Apparatus

Ordering Information

Catalog No.		Order Qty
K19400	High Temperature Dropping Point Apparatus, 115V 60Hz	1
K19410	High Temperature Dropping Point Apparatus, 220-240V 50/60Hz	
	Accessories	
250-000-03F	ASTM 3F Thermometer Range: 20 to 760°F	7
250-000-03C	ASTM 3C Thermometer Range: –5 to +400°C	
K194E7	Cup Plug Gauge Per Fig. 1, ASTM D566 and Fig. 1-E-7, ASTM D2265	1
K194EA	Grease Cup	
K194EB	Test Tube, 13x100mm	
K194EC	Cup Support	
K194E1	Thermometer Clamp	
K194E2	Upper Bushing	
K194E3	Lower Bushing	
K194E4	Bushing Support Ring	
K194E5	Thermometer Depth Gauge	
K194E6	Polished Metal Rod	

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Specifications

Conforms to the specifications of:
ASTM D2265, ASTM D4950
Maximum Temperature: 400°C (752°F)
Control Stability: ±0.5°C (±1°F)
Electrical Requirements: CE
115V 60Hz, Single Phase, 6.5A
220-240V 50/60Hz, Single Phase, 3.4A

Included Accessories:

Dropping Point Assemblies (6) consisting of: test tube, grease cup, thermometer clamp, upper and lower bushings and bushing support ring
Thermometer Depth Gauge
Polished Metal Rod
Cup Support

Dimensions lxwxh,in.(cm)

11½x9x14 (29x23x36)
Net Weight: 24½ lbs (11.1kg)

Shipping Information

Shipping Weight: 31 lbs (14.1kg)
Dimensions: 2.6 Cu. ft.

Please inquire about our Automated Dropping Point Test Equipment by contacting Koehler's Customer Service.

Koehler INSTRUMENT COMPANY, INC.

Oxidation Stability of Lubricating Greases by the Oxygen Bomb Method

K10901 Oxidation Bath with K11000 Oxidation Bombs

Test Method

The sample is oxidized in a bomb initially charged with oxygen at 110psi (758kPa) and maintained at elevated temperature for a specified aging period. The pressure drop inside the bomb is measured by means of a gauge or transducer.

Oxidation Stability Test Apparatus

- Conforms to ASTM D942 and related specifications
- Four sample testing capability
- Available Oxidata® Pressure Measurement System

Consists of Oxidation Bombs, Sample Dishes, Pressure Measuring and Recording Equipment and Oxidation Bath.

Oxidation Bomb–Stainless steel bomb consists of body, lid with stem and needle valve, and dish holder per ASTM specifications. Bomb interior surfaces and inside of stem have a high polish to facilitate cleaning. Safely withstands a working pressure of 180psi (1241kPa) at 99°C (210°F). Includes PTFE gasket seals (3) and cap screws with wrench. PTFE-fluorocarbon seals are available (see Accessories).

Pressure Measurement and Recording Equipment–Select mechanical pressure gauges or, for greater convenience and accuracy in test reporting, the Oxidata® Pressure Management System designed expressly for ASTM oxidation tests.

Pressure gauge measures pressure inside Oxidation Bomb with accuracy of better than 0.5psi (3.45kPa) in accordance with ASTM specifications. Range: 0-160psi (0-1100kPa), graduated in 1psi intervals. Cleaned for oxygen service.

Oxidata® Pressure Measurement System–A complete electronic measurement system based on powerful Oxidata® software for Windows® and Windows 95® environments. Electronically measures and reports pressure versus time and accuracy of better than 0.5psi (3.45kPa) in the range of 0-200psi (0-1378kPa) for four channels in graphical tabular format. Included RTD attachment permits measurement and reporting of bath temperature. Includes transducers, data acquisition card, multiplexer, Oxidata® software, RTD probe assembly and connecting cables and hardware. Refer to page 115 for complete specifications on Oxidata® software.

Oxidation Bath–Constant temperature oil bath holds bombs at the proper depth for determining oxidation stability of lubricating greases. Microprocessor PID control provides quick temperature stabilization without overshoot and the unit is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Heavily insulated welded stainless steel bath interior has a bomb support rack and overflow standpipe/drain to maintain proper working depth. Steel exterior has a corrosion-resistant polyurethane enamel finish.

Also available–Special baths to accommodate two test methods:

- *ASTM D942 and D525 (Oxidation Stability of Gasoline–Induction Method on pages 81-82)*
- *ASTM D942 and D972 (Evaporation Loss of Lubricating Greases and Oils on page 149)*
- *Higher temperature models are available.*

Please contact Koehler's Customer Service for additional information.

Oxidation Stability of Lubricating Greases by the Oxygen Bomb Method

Oxidata® Pressure Measurement System

Specifications

Conforms to the specifications of:
ASTM D942; IP 142; DIN 51808; FTM 791-3453
Oxidation Bath:
Capacity: four (4) oxidation bombs
Temperature Range: ambient to 275°F (135°C)
Bath Medium: 12.5 gal (47.3L) white technical oil
Electrical Requirements: CE
115V 60Hz, Single Phase, 13.0A
220-240V 50/60Hz, Single Phase, 6.8A

Dimensions dia.xh,in.(cm)

Interior: 16x14 (41x36)
Overall: 19½x28½ (50x72)

Shipping Information (with electronic pressure measurement system)

Shipping Weight:
Bath: 75 lbs (34.0kg)
Electronic Pressure Measurement System: 48 lbs (21.8kg)
Dimensions:
Bath: 16.7 Cu. ft.
Electronic Pressure Measurement System: 7.8 Cu. ft.

Ordering Information

Catalog No.		Order Qty
Oxidation Bomb		
K11000	Oxidation Bomb	4
Pressure Measurement and Recording Equipment		
*Select either Pressure Gauges or Oxidata® Pressure Measurement System**		
311-160-003	Pressure Gauge	4
K11005	4-Unit Electronic Pressure Measurement for Lubricating Grease Oxidation Tests, 115V 60Hz	
K11095	4-Unit Electronic Pressure Measurement for Lubricating Grease Oxidation Tests, 220-240V 50/60Hz	
Oxidation Bath		
K10901	Oxidation Bath, 115V 60Hz	1
K10991	Oxidation Bath, 220-240V 50/60Hz	
Accessories		
K11040	Borosilicate Glass Dish	20
250-000-22F	ASTM 22F Thermometer. Range: 204 to 218°F	
250-000-22C	ASTM 22C Thermometer. Range: 95 to 103°C	1
355-001-001	White Technical Bath Oil, 1 Gallon container	13
355-001-003	White Technical Bath Oil, 5 Gallon container	3
	See page 8 for specifications	
K10504-0-1	Transducer Assembly	
K10551	Pressure Line. For pressurizing Oxidation Bomb. 6 ft (1.83m) long, with quick release coupling for needle valve on bomb and threaded fitting for oxygen tank	1
K10556	Oxygen Manifold Pressure Relief System Connects to oxygen source to prevent overcharging of bomb. Equipped with relief valve to vent at 125psi and 300 series stainless steel 150psi burst disk assembly. Constructed from 300 series stainless steel. Cleaned for oxygen service.	
K11029	PTFE-fluorocarbon Gasket	

**This ordering information is for installation to Koehler grease oxidation test equipment. For other makes of equipment, a few items of basic hardware may also be required–please contact your Koehler representative for assistance.*

K11000 Oxidation Bomb

Corrosion Preventive Properties of Lubricating Greases

Corrosion Preventive Properties of Lubricating Greases

Corrosion Preventive Properties of Lubricating Greases in Presence of Dilute Synthetic Sea Water Environments

Test Method

Determines the corrosion preventive properties of greases when distributed in a tapered roller bearing stored under wet conditions.

Corrosion Preventive Properties Apparatus

- Conforms to ASTM D1743 and D4950 specifications

Distributes a lubricating grease sample in a roller bearing by running the bearing under light thrust load. Corrosion preventive capability is determined on a pass/fail basis by the presence of rust spots (1mm or larger) on the bearing race after a 60 second run-in period followed by prolonged exposure to water at constant temperature. Consists of variable speed motor, 1750rpm run-in stand, bearing holder assemblies, spindle/thrust loading device, mechanical grease packer pliers and test bearings.

Specifications

Conforms to the specifications of: ASTM D1743, D4950, Draft Method, D5969
Drive Motor: 1750rpm
Electrical Requirements: CE
115V 60Hz, Single Phase, 2.0A
220-240V 50/60Hz. Single Phase, 1.0A

Included Accessories

Bearing Holder Assemblies (3): Consisting of:
1kg weight
upper and lower plastic collars for cone
plastic collar for cup
plastic jar with screw cap
metal screw
Spindle/Thrust Loading Device
Mechanical Grease Packer
Pliers
Test Bearings (3) (cone and roller assemblies)

Dimensions lxwxh,in.(cm)
10x15x20 (25.4x38.1x50.8)
Net Weight: 27 lbs (12.2kg)

Shipping Information
Shipping Weight: 36 lbs (16.3kg)
Dimensions: 5 Cu. ft.

Ordering Information

Catalog No.	
K17980	Corrosion Preventive Properties Apparatus, 115V 60Hz
K17989	Corrosion Preventive Properties Apparatus, 220-240V 50/60Hz

Accessories

K17981	Bearing Holder Assembly
K17981-0-2	Upper Flange
K17981-0-3	Lower Flange
K17982	Mechanical Grease Packer
K17983	Pliers
K17984	Plastic Jar
289-004-002	Test Bearing

K17980 Corrosion Preventive Properties Apparatus

Corrosion Preventive Properties Apparatus (Alternate Method)

- Conforms to ASTM D1743-73 specifications

Determines corrosion preventive properties of lubricating greases in accordance with original ASTM D1743-73 specifications, now incorporated as Appendix #2 in the current ASTM D1743 method. Offers a suitable alternative to the new method for laboratories needing a quicker screening test method. Consists of drive motor on base with driving cone hub, thrust loading device, mechanical grease packer, test bearings (3), bearing supports (3) and containers with lids (3).

Specifications

Conforms to the specifications of: ASTM D1743-73, FTM 791-4012
Electrical Requirements: CE
115V 60Hz, Single Phase, 5.2A
220-240V 50/60Hz, Single Phase, 2.6A

Dimensions lxwxh,in.(cm)
7x12x9¾ (18x30x25)
Net Weight: 27 lbs (12.3kg)

Shipping Information
Shipping Weight: 36 lbs (16.3kg)
Dimensions: 5 Cu. ft.

Ordering Information

Catalog No.	
K17970	Corrosion Preventive Properties Apparatus (Alternate Method), 115V 60Hz
K17979	Corrosion Preventive Properties Apparatus (Alternate Method), 220-240V 50/60Hz

Accessories (Alternate Method)

K17900	Thrust Loading Device and Mechanical Grease Packer
K17910	Test Bearing
K17920	Bearing Supports
K17930	Container with Lid

Copper Corrosion from Lubricating Grease

Test Method

Measures the tendency of lubricating grease to corrode copper under static conditions. A polished copper strip is immersed in a sample of grease at elevated temperature for a specified period. The strip is examined for corrosion and a classification number from 1-4 is assigned based on a comparison with the ASTM Copper Strip Corrosion Standards.

Copper Strip Tarnish Test Apparatus

- Conforms to ASTM D4048 specifications

Ordering Information

Catalog No.		Order Qty
K25330	Test Tube Bath, 115V 60Hz Constant temperature bath with microprocessor temperature control. Control features °C/°F switchable digital setpoint and display and overtemperature cut-off protection. Temperature range from ambient to 190°C (374°F) with ±1°C (±2°F) stability. Welded stainless steel inner wall and powder coated steel outer wall construction, fully insulated	1
K25339	Test Tube Bath, 220-240V 50/60Hz	
K25308	Test Jar Rack Inserts in K25330/K25339 baths to hold sixteen 332-004-001 Test Jars	1
332-004-001	Test Jar	16
K25080	Copper Test Strip Conforming to ASTM specifications	16
380-150-001	Silicone Carbide Paper, 150 grit For polishing of test strips Pack of 50 sheets	1
380-240-001	Silicone Carbide Paper 240 Grit For final polishing of test strips Pack of 50 sheets	1
380-150-000	Silicone Carbide Grain, 150 Grit For final polishing of test strips. 1 lb package	1
K25000	Polishing Vise Holds copper strip firmly in place without marring the edges. Stainless steel, mounted on a composition base	1
K25100	ASTM Copper Corrosion Standards Colored reproductions of tarnished strips encased in plastic	1
332-004-002	Viewing Test Tube Protects copper strip during inspection or storage	16
250-000-130F	ASTM 130F Thermometer Range: 20 to 220°F	1
250-000-130C	ASTM 130C Thermometer Range: –7 to +105°C	
K460-0-8	Vented Cork	16

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

K25339 Constant Temperature Bath with 332-004-001 Test Jars

Specifications:

Conforms to the specifications of:
ASTM D4048, FTM 791-5309
Test Tube Bath Capacity: 16 test jars
Maximum Temperature: 190°C (374°F)
Temperature Control Stability: ±1°C (±2°F)
Bath Medium: 5 gal (18.9L) water or high temperature heat transfer fluid
Electrical Requirements: CE
115V 60Hz, Single Phase, 7.5A
220-240V 50/60Hz, Single Phase, 4A

Dimensions lxwxh,in.(cm)

15½x12½x14 (39x32x36)
Net Weight: 27 lbs (12.2kg)

Shipping Information

Shipping Weight: 40 lbs (18.1kg)
Dimensions: 7.8 Cu. ft.

Koehler INSTRUMENT COMPANY, INC.

Roll Stability of Lubricating Grease

K18320 Double-Unit Roll Stability Tester

Specifications

Conforms to the specifications of:
ASTM D1831, MIL-G-10924SA
Maximum Temperature: 200°F (93°C)
Temperature Control Stability: ±2°F (±1°C)
Electrical Requirements (Single and double unit models): CE
115V 60Hz, Single Phase, 10.5A
220-240V 50Hz, Single Phase, 5.5A
220-240V 60Hz, Single Phase, 5.5A

Included Accessories

Test Cylinders with threaded end caps and O-ring seals
Test Rollers, steel, 5kg

Dimensions lxwxh,in.(cm)

Single-Unit: 16½x18⅝x15 (42x47x38)
Double-Unit: 16½x18⅝x15 (42x47x38)
Four-Unit: 25x18⅝x15 (64x47x38)

Net Weight:
Single-Unit: 98 lbs (44.4kg)
Double-Unit: 116 lbs (52.6kg)
Four-Unit: 187 lbs (84.8kg)

Shipping Information

Shipping Weight:
Single-Unit: 142 lbs (64.4kg)
Double-Unit: 175 lbs (79.4kg)
Four-Unit: 270 lbs (122.5kg)

Dimensions:
Single-Unit: 7.7 Cu. ft.
Double-Unit: 9.8 Cu. ft.
Four-Unit: 16.6 Cu. ft.

Test Method

Provides an indication of shear stability of lubricating greases by testing the change in worked penetrations after two hours in the roll stability tester.

Roll Stability Tester

- Conforms to ASTM D1831 and related specifications
- Single, double and four-unit models
- Microprocessor programmable high accuracy temperature control
- High Temperature model

Roll stability apparatus for shear stability tests on lubricating greases. Rotates steel test cylinders at 10 or 165rpm in a thermostatically controlled environment at temperatures of up to 200°F (93.3°C). Drive system is powered by a rugged ratio motor, and interchangeable drive chain sprockets are easily accessible for converting unit to either operating speed. Microprocessor PID control provides quick temperature stabilization without overshoot and is protected by an overtemperature control circuit that interrupts power should temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* A balanced cast aluminum fan and 1200W heater provide efficient, uniform heat distribution. A dial thermometer in the hinged cover displays chamber temperature. Heaters and drive chain mechanism are shielded for operator safety. Insulated steel cabinet and base are finished with a durable polyurethane enamel finish.

High Temperature Model–A high temperature model is also available that expands the temperature range to 320°F (160°C). Tests can be conducted using the high temperature model unit for time/temperature specifications beyond those listed in existing D1831.

Ordering Information

Catalog No.	
Roll Stability Tester	
K18300	Single-Unit Model, 115V 60Hz
K18305	Single-Unit Model, 220-240V 50Hz
K18306	Single-Unit Model, 220-240V 60Hz
K18320	Double-Unit Model, 115V 60Hz
K18325	Double-Unit Model, 220-240V 50Hz
K18326	Double-Unit Model, 220-240V 60Hz
K18340	Four-Unit Model, 115V 60Hz
K18341	High Temperature Four-Unit Model, 115V 60Hz
K18345	Four-Unit Model, 220-240V 50Hz
K18346	Four-Unit Model, 220-240V 60Hz
K18347	High Temperature Four-Unit Model, 220/240V 50Hz
K18348	High Temperature Four-Unit Model, 220/240V 60Hz
Accessories	
K183-0-1A	Test Cylinder, plated steel with threaded end caps and O-ring seals
K183-0-4	Steel Cylinder Roller

Apparent Viscosity of Lubricating Greases

Test Method

Apparent viscosity is used to evaluate pumpability and handling characteristics of greases and is also suitable for analysis of adhesives, sealants and other semi-solid products. The sample is forced through a capillary by means of a gear pump-driven hydraulic system and the resulting pressure in the system is measured. Apparent viscosity is then calculated from the flow rate and pressure. Eight different capillaries and two pump speeds are used to determine the apparent viscosity at sixteen shear rates.

Pressure Viscometers

- Conforming to ASTM D1092 and related specifications
- Mechanically refrigerated low temperature model

Low Temperature Pressure Viscometer–Consists of power, hydraulic and grease systems with refrigerated test chamber. Hydraulic system includes constant displacement gear-driven metering pump, hydraulic oil reservoir with 50-mesh screen, stainless steel tubing, high pressure valve and fittings. Drive motor has interchangeable 40 and 64 tooth gears for two-speed operation. Four interchangeable gauges of 0-60, 0-100, 0-600 and 0-5000psi ranges monitor system pressure.
Supplied with three precision machined grease assemblies, each including piston, caps and thermocouple; set of eight (ASTM Nos. 1-8) stainless steel capillaries; and wrenches for gauge installation and removal. The refrigerated test chamber holds three cylinders at a time for sample preparation. Operating range is from ambient to –65°F (–53.8°C), with stability of ±0.5°F (±0.3°C). The refrigeration system uses hermetically sealed, self-lubricating compressors in cascaded configuration to provide efficient cool-down and trouble-free long term operation.
Floor-mounted cabinet is constructed of polished stainless steel with a welded reinforced frame.

Pressure Viscometer–Complete apparent viscometer meeting ASTM D1092 specifications. Includes power, hydraulic and grease systems and standard accessories as supplied with the Low Temperature Pressure Viscometer but without refrigerated test chamber or stainless steel cabinet. Mounted on a sturdy base having locating feet for permanent benchtop placement.

Specifications

Conforms to the specifications of:
ASTM D1092
Operating Range: performs apparent viscosity determinations at sixteen different shear rates
Low Temperature Pressure Viscometer:
Temperature Range: ambient to –65°F (–54°C)
*Optional –100°F cooling range available on special order**
Temperature Control Precision: ±0.5°F (±0.3°C) throughout the operating range
Test Chamber Medium: denatured alcohol
Electrical Requirements: CE
115V 60Hz
220-240V 50Hz
220-240V 60Hz

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Ordering Information

Catalog No.

Low Temperature Pressure Viscometer

K22690	Low Temperature Pressure Viscometer, 115V 60Hz
K22695	Low Temperature Pressure Viscometer, 220-240V 50Hz
K22696	Low Temperature Pressure Viscometer, 220-240 60Hz

**Please call or write for ordering Information on extended (–100°F) cooling range.*

Pressure Viscometer

K22600	Pressure Viscometer, 115V 60Hz
K22615	Pressure Viscometer, 220-240V 50Hz
K22610	Pressure Viscometer, 220-240V 60Hz

Accessories

K22690-0-27	Grease Cylinder Assembly for Low Temperature Pressure Viscometer (K22690 Series) – Includes piston and caps
K226-0-16	Grease Cylinder Assembly for Pressure Viscometer - (K22600 Series) – Includes piston and caps
K226-0-22	Capillary Set. Nos. 1-8
250-000-74F	ASTM 74F Thermometer Range –67.5 to –62.5°F
250-000-74C	ASTM 74C Thermometer Range: –55.4 to –52.6°C

Included Accessories

Stainless Steel Grease Cylinder Assemblies (3)
Thermocouples (3)
Set of Stainless Steel Capillaries (Nos. 1-8)
Interchangeable Pressure Gauges (4)
Interchangeable Pump Drive Gears, 40 and 64-tooth
Set of Wrenches (3)

Dimensions lxwxh,in.(cm)
Low Temperature Pressure Viscometer: 43¼x30¾x66¼ (110x78x168)
Net Weight: 640 lbs (290.3kg)
Pressure Viscometer: 30x12x36 (76x30x91)
Net Weight: 121 lbs (54.9kg)

Shipping Information

Low Temperature Pressure Viscometer:
Shipping Weight: 900 lbs (408.2kg)
Dimensions: 89.8 Cu. ft.
Pressure Viscometer:
Shipping Weight: 186 lbs (84.4kg)
Dimensions: 14.8 Cu. ft.

Grease Mobility

K22680 Grease Mobility Tester

Test Method

Determines the resistance of lubricating grease to flow under prescribed conditions. Mobility is measured in grams per second by pumping the sample through a standardized SOD pressure viscometer at controlled temperature and pressure.

Grease Mobility Tester

- U.S. Steel Method; ASTM Draft Method
- Test temperatures as low as –30°F (–34.4°C)

Performs grease mobility tests at low temperatures to predict pumpability characteristics. Determines the suitability of greases for applications in centralized or bulk systems where pumps, valves or pipes are used to distribute or transfer grease. Consists of pressure viscometer, cooling bath and refrigeration system. The stainless steel pressure viscometer is fitted with a modified No.1, 40:1 ratio capillary. After the sample is loaded in the pressure viscometer, the assembly is installed in the cooling bath and allowed to reach the test temperature. Mechanically refrigerated cooling bath can attain test temperatures as low as –30°F (–34.4°C) with stability of ±2°F (±1°C). With the sample at the test temperature, the flow of grease is started under the selected pressure on a nitrogen tank regulator. Flow per second is determined by collecting the grease for a specified period. Includes sample collector turntable.

Specifications

Conforms to the specifications of:
U.S. Steel Method; ASTM Draft Method
Minimum Temperature: –30°F (–34.4°C)
Control Stability: ±2°F (±1°C)

Included Accessories

Grease Cylinder (pressure viscometer) with modified No.1, 40:1 capillary
Sample Collector Turntable

Electrical Requirements: CE
115V 60Hz, Single Phase, 6A
220-240V 50 or 60Hz, Single Phase, 3A

Dimensions lxwxh,in.(cm)

Cooling Chamber: 12x12x30 (30.5x30.5x76)
Refrigeration Unit: 15x12x12 (38x30x30)
Net Weight: 114 lbs (51.7kg)

Shipping Information

Shipping Weight: 188 lbs (85.3kg)
Dimensions: 18.4 Cu. ft.

Ordering Information

Catalog No.	
K22680	Grease Mobility Apparatus, 115V 60Hz
K22685	Grease Mobility Apparatus, 220-240V 50Hz
K22686	Grease Mobility Apparatus, 220-240V 60Hz

Accessories

K22680-0-22	Grease Cylinder with plunger and fittings
K22680-0-16	Capillary
250-100-001	Thermometer dial type Range: –100 to +100°F with 2°F subdivisions

Low-Temperature Torque of Lubricating Grease

Low-Temperature Torque of Ball Bearing Grease

Low-Temperature Torque of Grease-Lubricated Wheel Bearings

Test Method

Significant for the design and specification of greases for low temperature service, the low temperature torque test measures the extent to which a grease sample retards rotation of a bearing assembly at the test temperature.

Low Temperature Torque Apparatus

- Digital torque indication for two samples
- Choice of test rig combinations
- Mechanically refrigerated, with standard –65°F (–54°C) operating range
- Optional cooling range to –100°F (–73°C)
- Conforms to ASTM D1478, D4693 and D4950 specifications
- Data acquisition software available

Refrigerated two unit apparatus for ASTM low temperature torque tests on lubricating greases. Includes an insulated, thermostatically controlled air chamber with test rigs, drive shafts and externally mounted gear motors. Rotates drive shafts at 1rpm while electronic load cell-strain gauge indicators measure the torque required to restrain the test rigs. Digital LED displays indicate torque for each drive unit and cold chamber temperature. On ASTM D4693 models, spindle temperature is also indicated for each drive unit. Includes drive shaft overtorque protection—when drive shaft torque exceeds a preset value, the drive motors automatically shut down to prevent breakage of shaft insulators. Standard cooling range of –65°F (–54°C) meets ASTM requirements for D1478 and D4693 test methods. Optional –100°F (–73°C) range is available for special testing requirements.

ASTM D1478 Model for Ball Bearing Greases–Equipped with two test cages and two 6204 ball bearings per ASTM D1478 specifications.

ASTM D4693 Model for Automotive Wheel Bearing Greases–Equipped with two spring loaded spindle-bearings-hub assemblies, bearing packer assembly and bearing installation and removal tools.

Combined ASTM D1478-D4693 Model–Equipped with one test cage and one 6204 ball bearing for ASTM D1478 testing and one spindle-bearings-hub assembly with bearing packer and tools for ASTM D4693 testing.

Data acquisition software–Data acquisition software facilitates running both ASTM D1478 and D4693 tests. Graph of torque versus time details starting torque, running torque and time elapsed. Includes software, data acquisition board and cable.

Specifications

Conforms to the specifications of:
ASTM D1478, D4693, D4950; FTM 791-334
Cooling Range:
Standard: –65°F (–54°C)
Optional: –100°F (–73°C)
Temperature Uniformity: ±1°F (±0.5°C)
Refrigeration: air cooled mechanical cascade hermetic system
Cabinet: floor-mount, polished stainless steel exterior, rides on swivel casters

K18860 Low Temperature Torque Apparatus

Ordering Information

Catalog No.	Test Method	Cooling Range	Electrical Requirements CE
K18852	ASTM D1478	–65°F(–54°C)	220-240V 50Hz
K18862			220-240V 60Hz
K18853		–100°F(–73°C)	220-240V 50Hz
K18863			220-240V 60Hz
K18850	ASTM D4693	–65°F(–54°C)	220-240V 50Hz
K18860			220-240V 60Hz
K18851		–100°F(–73°C)	220-240V 50Hz
K18861			220-240V 60Hz
K18854	Combined ASTM D1478-D4693	–65°F(–54°C)	220-240V 50Hz
K18864			220-240V 60Hz
K18855		–100°F(–73°C)	220-240V 50Hz
K18865			220-240V 60Hz

Accessories

K18871	Data Acquisition Package.	1
289-001-006	Test Bearing, 6204, for ASTM D1478	1
308-230-009	Chart Recorder, 115V/230V	1
K18860-0-24	Inboard Test Bearing, for ASTM D4693, LM-67010-LM-67048 tapered roller bearing	1
K18860-0-16	Outboard Test Bearing for ASTM D4693, LM-11910-LM-11949 tapered roller bearing	1

Dimensions lxwxh,in.(cm)
48½x34x45½ (123x86x116)
Net Weight: 600 lbs (272.2kg)

Shipping Information
Shipping Weight: 697 lbs (316.1kg)
Dimensions: 6.4 Cu. ft.

Koehler INSTRUMENT COMPANY, INC.

Leakage Tendencies of Automotive Wheel Bearing Greases

Test Method

Evaluates the tendency of automotive wheel bearing grease to separate oil and/or grease under prescribed laboratory conditions. The test is performed at elevated temperature in a modified automotive spindle-hub assembly rotated at 660rpm. Any leakage of oil or grease during the test period is collected and weighed. See also "ASTM D4290 Accelerated Leakage Tendencies Method" (Page 161).

Leakage Tendencies Tester

- Conforms to ASTM D1263 and FTM 791-3454 specifications
- Microprocessor programmable high accuracy temperature control

Consists of a modified front wheel hub and spindle assembly with drive motor and constant temperature air cabinet. Rotates hub at 660rpm while maintaining spindle temperature at a constant 220°F (104°C) or other specified temperature. Oil that has separated from the sample grease during the test period is collected in the hub cap and in a leakage collector that installs on the spindle. The hub is rotated by a durable ⅛hp motor through a V-belt drive. Microprocessor PID control provides quick temperature stabilization without overshoot, and the unit is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Cabinet is insulated on all sides and has a hinged cover for easy access to the hub-spindle assembly. Thermometer ports in the spindle and the cabinet allow for precise setting and monitoring of test temperature. Housed in a heavy-gauge steel exterior with polyurethane enamel finish.

Specifications

Conforms to the specifications of:
ASTM D1263; FTM 791-3454
Maximum Temperature: 250°F (121°C)
Electrical Requirements: CE
115V 60Hz, Single Phase, 13.0A
220-240V 50Hz, Single Phase, 7A
220-240V 60Hz, Single Phase, 7A

Included Accessories

Large (Inner) Bearing (1)
Small (Outer) Bearing (1)

Dimensions lxwxh,in.(cm)

20½x18x15 (52x46x38)
Net Weight: 95 lbs (43.1kg)

Shipping Information

Shipping Weight: 145 lbs (65.8kg)
Dimensions: 8.3 Cu. ft.

High temperature models to 205˚C available. Contact your Koehler representative for information.

Ordering Information

Catalog No.		Order Qty
Leakage Tendencies Tester		1
K18700	Leakage Tendencies Tester, 115V 60Hz	
K18795	Leakage Tendencies Tester, 220-240V 50Hz	
K18790	Leakage Tendencies Tester, 220-240V 60Hz	
	Accessories	
K18723	Torque Wrench	1
250-000-07F	ASTM 7F Thermometer Range: 30 to +580°F	2
250-000-07C	ASTM 7C Thermometer Range: –2 to +300°C	
289-004-004	Large (Inner) Bearing	
289-004-003	Small (Outer) Bearing	

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Life Performance of Automotive Wheel Bearing Grease

Leakage Tendencies of Automotive Wheel Bearing Grease Under Accelerated Conditions

Test Method

Evaluates the high temperature stability of automotive wheel bearing greases in a modified automotive front wheel hub-spindle-bearings assembly. The ASTM D3527 Life Performance test employs severe conditions–25 lbf (111N) thrust load, 1000rpm, 160°C spindle temperature –to induce grease deterioration and failure. The test continues in a 20/4 hour on/off cycle until grease breakdown causes measured drive motor torque to increase past an established end point. The number of hours to failure is the test result. The ASTM D4290 Accelerated Leakage Tendencies procedure employs similar test conditions for a 20 hour period, after which leakage of grease and oil is measured and the bearings are washed and examined for deposits of gum and varnish.

High Temperature Wheel Bearing Grease Tester

- Conforms to ASTM D3527, D4290 and D4950 specifications
- Fully automatic operation
- Digital monitoring of all test functions

Performs life performance and accelerated leakage tendencies tests on lubricating greases in accordance with ASTM test specifications. Consists of a modified front wheel hub-spindle-bearings assembly housed in a constant temperature oven and coupled to a ¼hp variable-speed drive motor. Controls test functions automatically and provides continuous digital display of motor torque, rpm, chamber temperature, spindle temperature, time cycle and elapsed time. Test parameters outside of ASTM specifications can be selected by the operator for in-house testing. Automatically terminates test and displays elapsed on-cycle hours when grease deterioration causes drive motor torque to increase to the calibrated end point. A built-in thirty second time delay circuit prevents erroneous test terminations due to momentary surges in motor torque at the beginning of the on-cycle. Insulated constant temperature oven is equipped with a 1200W heater and balanced ⅛ hp circulation fan for efficient heat distribution. Sliding access doors and a movable platform that swings the drive motor out of the way provide easy access to the spindle assembly. Modified steel spindle and hub assembly conforms to all critical 1971 Chevy II dimensions and is fitted with thermocouple, bearing thrust loading device and anodized aluminum grease collector. All controls and monitors are housed in a separate cabinet.

Ordering Information

Catalog No.		Order Qty
Wheel Bearing Grease Tester		1
K18500	High Temperature Wheel Bearing Grease Tester, 115V 60Hz	
K18595	High Temperature Wheel Bearing Grease Tester, 220-240V 50Hz	
K18590	High Temperature Wheel Bearing Grease Tester, 220-240V 60Hz	
	Accessories	
250-000-42C	ASTM 42C Thermometer Range: 95 to 255°C	1
289-004-001	Inboard Bearing Set Includes LM67048 Cone and LM67010 Cup	
289-004-002	Outboard Bearing Set Includes LM11949 Cone and LM11910 Cup	

K18500 High Temperature Wheel Bearing Grease Tester

Specifications

Conforms to the specifications of:
ASTM D3527, D4290, D4950
Digital controls and displays:
Timer: on/off cycle and real time
Chamber Temperature: °C
Spindle Temperature: °C
Motor rpm: 0-1725rpm
Motor Torque: current draw
Elapsed Time: 9999.9 hr.
Maximum Temperature: 177°C (350°F)
Electrical Requirements: CE
115V 60Hz, Single Phase, 13A
220-240V 50Hz, Single Phase, 7A
220-240V 60Hz, Single Phase, 7A

Included Accessories

Thermocouples (2)
Thermometer holder
Bearings (1set)
Grease Packer Assembly
Bearing Installation/Removal Tools:
bearing installer, small and large
bearing cup removers, bearing cup installer,
bearing puller and spindle wrenches (pins)

Dimensions lxwxh,in.(cm)

Test Unit: 16x20x15¾ (41x51x40)
Control Unit: 16x14x16 (41x36x41)
Net Weight: 145 lbs (65.8kg)

Shipping Information

Shipping Weight: 230 lbs (104.3kg)
Dimensions: 14.8 Cu. ft.

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Water Washout Characteristics of Lubricating Greases

Test Method

A grease sample is packed in a ball bearing and subjected to a steady water stream under controlled test conditions. The percentage of grease washed out in a one hour period is determined by weight.

Water Washout Tester

- Conforms to ASTM D1264, D4950 and related specifications

Rotates a lubricated ASTM ball bearing at 600rpm in a modified bearing/housing assembly while impinging the bearing with a jet of water at the specified flow rate and temperature. The tared bearing and bearing shields are weighed before installation in the bearing housing and again after testing and drying to determine the amount of sample loss. Consists of reservoir, bearing housing, circulation system and drive motor. Reservoir is equipped with cartridge heater, thermoregulator and thermometer port for accurate temperature control at 100°F and 175°F (38°C and 79°C) per ASTM specifications. Circulation system includes constant velocity carbon bearing gear pump, valves and flowmeter directing a controlled water flow to a capillary (1mm) spray nozzle aimed at the bearing housing. Rugged ⅛hp drive motor rotates test bearing at 600rpm while driving the circulation pump. A two-pulley system permits independent pump operation to circulate water while heating it to test temperature. Mounted on a finished steel base with locating feet for permanent benchtop placement.

Ordering Information

Catalog No.		Order Qty
Water Washout Tester		1
K19200	Water Washout Tester, 115V 60Hz	
K19295	Water Washout Tester, 220-240V 50Hz	
K19290	Water Washout Tester, 220-240V 60Hz	
	Accessories	
289-001-006	Test Bearing	3
K192-1-4	Outer Bearing Shield	3
K192-1-6	Inner Bearing Shield	3
250-000-15F	ASTM 15F Thermometer Range: 30 to 180°F	1
250-000-15C	ASTM 15C Thermometer Range: –2 to +80°C	

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Specifications

Conforms to the specifications of:
ASTM D1264, D4950; IP 215; FTM 791-3252
Drive Motor: ⅛hp 1725rpm
Temperature Control: ±1°F (±0.5°C) sensitivity
Electrical Requirements: CE
115V 60Hz, Single Phase,10.1A
220-240V 50Hz, Single Phase, 5.1A
220-240V 60Hz, Single Phase, 5.1A

Included Accessories

Ball Bearing (2)
Drive Train Guard
Acrylic Reservoir Cover
Outer Bearing Shield
Inner Bearing Shield
Test Bearing

Dimensions lxwxh,in.(cm)

18x12x18¾ (46x30x48)
Net Weight: 67 lbs (30.4kg)

Shipping Information

Shipping Weight: 102 lbs (46.3kg)
Dimensions: 6.7 Cu. ft.

Resistance of Lubricating Grease to Water Spray

Test Method

Evaluates the ability of a lubricating grease to adhere to a metal surface when subjected to a direct water spray under controlled conditions. The percentage of grease sprayed off a stainless steel test panel after a specified period is determined by weight.

Water Spray Apparatus

- Conforms to ASTM D4049 specifications
- Improved spray chamber design

Complete Water Spray Apparatus meeting ASTM specifications, including spray chamber, delivery system and constant temperature reservoir. Sprays water at the specified rate and temperature on a test panel coated with sample grease. To test for water spray resistance, fill reservoir with 8L of tap water and set thermostat at test temperature. Circulate the water through the system to attain temperature equilibrium and insert the coated test panel in the spray chamber. Adjust water spray to 40psi (276kPa) and continue for 5 minutes. Water spray system includes ⅛hp positive displacement pump; spray nozzle with snubber fitting: 0-60psi pressure gauge; bypass valve; shut-off and drain valves; and flexible high pressure water lines. Hinged acrylic spray chamber cover is recessed into the chamber housing to insure watertight operation. Two thermometer wells permit separate monitoring of reservoir and water spray temperatures. Standardized grease application fixture coats test panel with the required thickness of sample grease. Uses tap water; does not require water hook-up.

Ordering Information

Catalog No.		Order Qty
Water Spray Apparatus		1
K18200	Water Spray Apparatus, 115V 60Hz	
K18295	Water Spray Apparatus, 220-240V 50Hz	
K18290	Water Spray Apparatus, 220-240V 60Hz	
	Accessories	
250-000-37C	ASTM 37C Thermometer Range: –2 to +52°C	1
K18210	Stainless Steel Test Panel	
K18220	Grease Application Fixture	

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

K18200 Water Spray Off Tester

Specifications

Conforms to the specifications of:
ASTM D4049
Circulation System:
Drive Motor: ⅛hp, 1725rpm
Pump: rotary gear positive displacement type
Pressure Gauge: 0-60psi
Temperature Control Stability: ±1°F (±0.5°C)
Electrical Requirements: CE
115V 60Hz, Single Phase, 13.3A
220-240V 50Hz, Single Phase, 6.8A
220-240V 60Hz, Single Phase, 6.8A

Included Accessories

Stainless Steel Test Panel
Grease Application Fixture

Dimensions lxwxh,in.(cm)

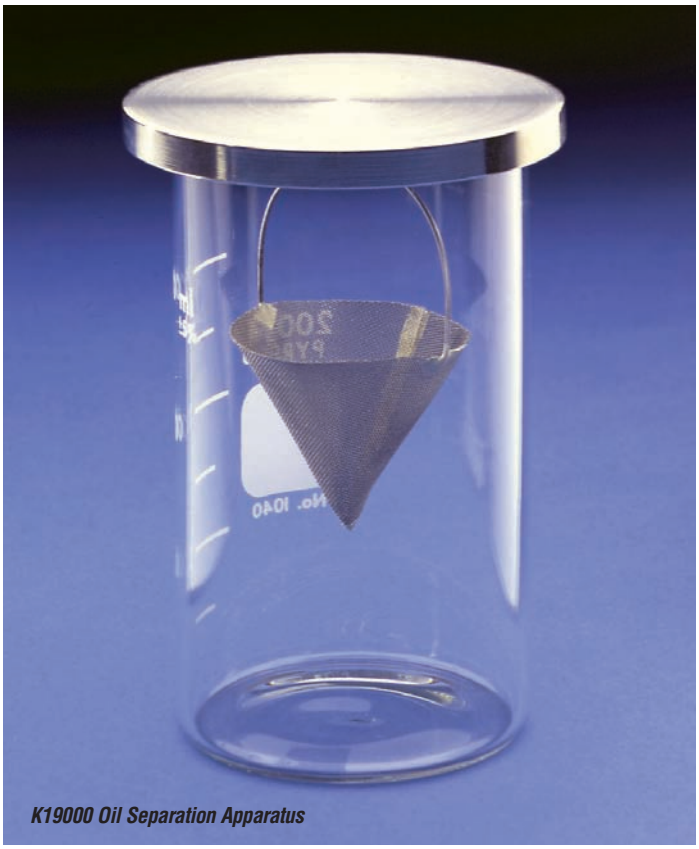
29x18x33½ (74x46x85)
Net Weight: 110 lbs (49.9kg)

Shipping Information

Shipping Weight: 180 lbs (81.6kg)
Dimensions: 14.2 Cu. ft.

Koehler INSTRUMENT COMPANY, INC.

Oil Separation From Lubricating Grease



K19000 Oil Separation Apparatus

Test Method

Determines the tendency of oil and lubricating grease to separate at elevated temperature.

Oil Separation Apparatus

- Conforms to ASTM D6184 and FTM 791-321 specifications

Consists of 60 mesh nickel gauze cone with wire handle, tall form 200mL beaker and cover with hook. Place sample in wire gauze cone and determine weight loss after heating at test temperature for specified time period. Withstands test temperatures of up to 900°F (482°C).

Shipping Information

Net Weight: ½ lb (0.2kg)
Shipping Weight: 1 lb (0.45kg)

Included Accessories

Beaker, 200mL
Cover and Hook Assembly
Cone Assembly

Ordering Information

Catalog No.	
K19000	Oil Separation Apparatus

Accessories

332-002-008	Beaker, 200mL
K190-0-1C	Cover and Hook Assembly
K190-0-5	Cone Assembly

Oil Separation On Storage of Grease

Test Method

Provides a measure of the stability of lubricating grease towards oil separation during storage.

Oil Separation Apparatus

- Conforms to IP 121 and DIN 51817 specifications

Consists of stainless steel separation cup with cone of 240 mesh woven wire cloth, 100g metal weight and oil cup. Oil separation is determined by placing the sample on the wire mesh cone and loading it with the 100g metal weight. The percentage of sample weight lost is calculated after a storage period of 42 hours.

Shipping Information

Net Weight: ¾ lb (.34kg)
Shipping Weight: 1 lb (.45kg)

Ordering Information

Catalog No.	
K19050	Oil Separation Apparatus

K19050 Oil Separation Apparatus

Oil Separation From Lubricating Grease During Storage

Test Method

Determines the tendency of lubricating grease to separate oil during storage in a 35 lb pail. The sample is placed on a sieve inside a special test cell and subjected to 0.25psi (1.72kPa) air pressure at constant temperature. Any oil that bleeds from the grease during a 24 hour period is collected in the cell and weighed.

Oil Separation Apparatus

- Conforms to ASTM D1742 and related specifications
- Four sample capability
- Controls temperature and air pressure

Consists of pressure bleeding test cells with air pressure regulation system and constant temperature air cabinet.

Pressure Bleeding Test Cell–Type A test cell includes cup assembly with funnel and positioning seat for beaker; cover with air inlet fitting; and 200-mesh stainless steel sieve strainer with brass support ring. Bayonet type connection and o-ring seal provide tight closure between cover and base. Cup, funnel and base are constructed of chrome plated spun copper. Order test beaker separately.

Constant Temperature Air Cabinet–Provides a constant temperature environment and regulated air pressure per ASTM specifications. Consists of an insulated airtight cabinet with pressure system to accommodate four pressure bleeding test cells. Equipped with electric heater, solid state controller, cooling coil and circulating fan for efficient temperature control at 77°F (25°C). Pressure system includes air inlet pressure regulator with gauge, cartesian manostat, manifold with control valves for four test cells, output gauge, manostat and gas washing bottle. Built-in pressure relief valve protects against pressure surge. Cabinet is constructed of double-wall stainless steel with full insulation. Order thermometer and pressure bleeding test cell separately.

Specifications

Conforms to the specifications of:
ASTM D1742, FTM 791-322
Capacity: four samples
Controller Sensitivity ±1°F (±0.5°C)
Electrical Requirements: CE
115V 60Hz, Single Phase, 3A
220-240V 50/60Hz, Single Phase, 1.5A

Dimensions lxwxh,in.(cm)
Interior: 19¾x19¾x21½ (50x50x55)
Overall: 47*x23¾x31¼ (119x60x79)
*includes external pressure system components
Net Weight: 121 lbs (54.9kg)

Shipping Information

Shipping Weight: 224 lbs (101.6kg)
Dimensions: 27.8 Cu. ft.

K18910 Constant Temperature Air Cabinet with K18900 Cell

Ordering Information

Catalog No.		Order Qty
K18910	Constant Temperature Air Cabinet,115V 60Hz	1
K18919	Constant Temperature Air Cabinet, 220-240V 50/60Hz	
K18900	Pressure Bleeding Test Cell	4

Accessories

332-002-009	Test Beaker, 20mL	4
250-000-57F	ASTM 57F Thermometer. Range: –4 to +122°F	1
250-000-57C	ASTM 57C Thermometer. Range: –20 to +50°C	

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

K18900 Pressure Bleeding Test Cell

Koehler INSTRUMENT COMPANY, INC.

Estimation of Deleterious Particles in Lubricating Grease

K19300 Deleterious Particles Determination Apparatus

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Test Method

Detects and estimates deleterious particle contamination in lubricating greases and other semi-solids and heavy liquids. Grease fillers can be tested for abrasive contaminants by first mixing them into petrolatum or grease known to be free of deleterious particles.

Deleterious Particles Determination Apparatus

- Conforms to ASTM D1404 specifications

Complete apparatus per Figure 1 and 2 of ASTM D1404. Rotates plastic plate 30° against stationary plate while applying 200psi pressure. Includes body, test plate holders, loading screw, calibrated spring with scale for applying test load and removable cap assembly with milled slot and handle for rotating test plates. Constructed of stainless steel. Order plastic test plates separately.

Ordering Information

Catalog No.		Order Qty
K19300	Deleterious Particles Determination Apparatus	1
	Accessories	
K19310	Plastic Test Plate. For use in Model K19300. Highly polished. Two (2) required for each test	20

Oil and Grease in Water and Wastewater by Infrared (IR)

Test Method

For the determination of oil and grease and nonpolar material in water and wastewater by an infrared (IR) determination of dimer/trimer of chlorotrifluoroethylene (S-316) extractable substances from an acidified sample. Included in this estimation of oil and grease are any other compounds soluble in the solvent.

Infrared Analyzer

- Analyze produced water on offshore oil rigs
- Monitor effluents from refineries or wastewater treatment and industrial plants
- Measurement of fats, oil and grease (FOG) discharges
- Determine efficiency of oil/water separation systems
- Conduct soil studies at remediation sites or around underground storage tanks
- Measurement of residual oil on pre-cleaned metal components
- Determine purity level of reclaimed solvents or virtually any on-site testing of water and soil requiring measurement of TOG and/or TPH concentration levels

Recommended for measuring total oil and grease (TOG) and total petroleum hydrocarbon (TPH) levels in water and soils, as well as fats, oil and grease (FOG) in water using the traditional EPA methods 413.2 and 418.1 with Freon-113 or ASTM Method D7066-04 with S-316, also compatible with other infrared transparent solvents such as hydrocarbon-free spectroscopic grade perchloroethylene, AK-225 or other infrared transparent solvent as the extracting solvent. The IR analyzer is ideal for on-site analysis to meet new European regulations. Since there is no evaporation step in the analysis the light end volatile components are retained for measurement.

Dimensions wxdxh,in.(cm)
6.5 x 6.5 x 5 (16.5x16.5x12.7)
Net Weight: 4.5 lb (2.0 kg)

Included Accessories
Power Supply
Instruction Manual

Specifications

Conforms to the specifications of:
ASTM D7066; EPA Methods 413.2 and 418.1
Type: Fixed filter infrared filtometer
Display: 4 digit, 7-segment red LED, 5/8 in. character height
Measurement Range:
For Water: 2 – 1000 ppm (using a 10:1 extraction ratio)
For Soil: 3 – 5000 ppm (using a 1:2 extraction ratio)
Usable Solvents for Extraction Process:
Freon, perchloroethylene, S-316, AK-225 or other infrared transparent solvent
Analysis Time: 10-15 minutes, including extraction process
Operating Temperature Range: 40°F (4°C) to 110°F (45°C)
User Selected Calibration: Zero balance adjustment. Up to 20 point curve fitting calibration
Repeatability: ± 1ppm
Electrical Requirements: CE
Voltage – 12VDC, +2% max.
Power – 7.5 watts max., 5 watts typical
Input – Switchcraft 760 plug or equivalent, center positive
Suggested Power Sources:
Wall Supply; AC/DC converter type (supplied as standard
12 volt auto battery adapter connector (optional)
Portable 12 volt battery pack (optional)

Ordering Information

Catalog No.	
K25552	Infrared Analyzer, 12 VDC
	Accessories
K25551-1	10mm Quartz Cuvette Cells, Set of 4
K25551-2	Car Adapter Cable
K25551-3	IR Sample Plate, pk 5
K25501	External 12V Battery Pack
K25502	Carrying Case
K25507	Dust Cover
K25509	Serial Printer

Lincoln Ventmeter

Test Method

The K95400 Lincoln Ventmeter evaluates the ventability of grease, which is useful in determining by consistency what type of greases can be used in a centralized automatic lubrication system. Furthermore, the size or diameter of the supply line in an automatic lubrication system can be accurately determined for a particular type of grease. Pressurizing lubricant grease in 25 feet coil tube to 1800 psi with a grease gun, opening the venting valve and reading the pressure on the gage after 30 seconds will provide the supply line size and maximum supply line information for the tested grease by referring the supplied grease ventmeter reading to supply line reference charts after measuring of the grease ventablility.

Lincoln Ventmeter

Lincoln Ventmeter, as a simulation device of a centralized lubrication system, consists of 25 feet coil tube with valve 1 at the pressure gage end and valve 2 at the end where a level grease gun is connected. Build up pressure with the grease gun attached when valve 1 closed. Open instantly valve 2 when pressure gage reading stabilizes at 1800 psi. Read the pressure gage after venting for 30 seconds. Repeat test three times and take an average reading to determine supply line pipe size and maximum length of supply line.

Test under Different Temperature – The test could be done under any temperature as application required. The standard test recommend three temperature: 0°F, 30°F and 75°F. When testing under temperature other than the ambient, the ventmeter filled with grease should be put in temperature chamber for at least 4 hours. The same test steps should be used for different temperature conditions.

Specifications

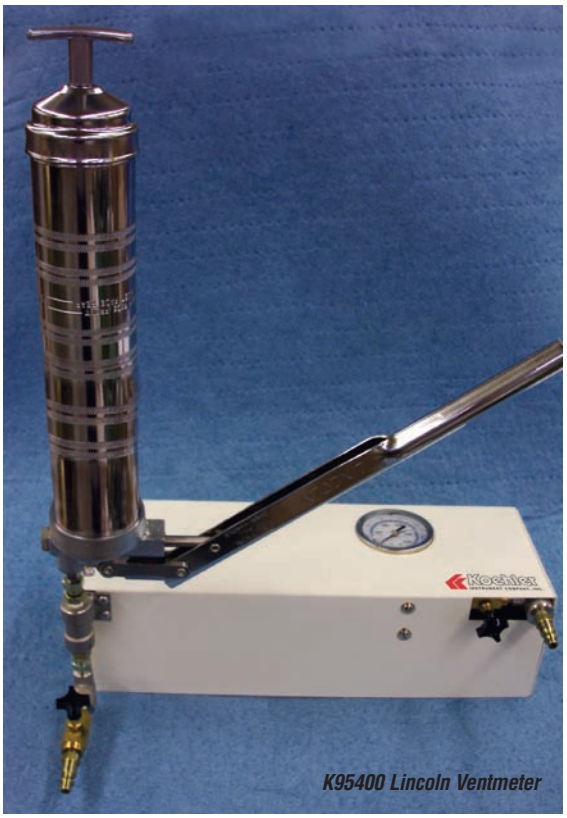
Model:
K95400
Electrical Requirements:
None

Dimensions lxwxh

Overall: 15"x6"x5"

Shipping Information

Shipping Weight: 12 lbs
Dimensions: 16"x10"x6"



K95400 Lincoln Ventmeter

Ordering Information		
Catalog No.		**Order Qty**
K95400	Lincoln Ventmeter	1
	Accessories	
K95400-1	Cleaning Kit	1

Additional Accessories

Additional equipment, materials and/or reagents are required to perform some of the test procedures in the preceding pages. Please refer to the applicable test method for further information, or contact Koehler for assistance.

Evaporation Loss of Lubricating Greases and Oils ..... **Page 148**

ASTM D972, D2878, IP 183, FTM 791-351

Laboratory Balance • m-Terphenyl • Air Supply

Evaporation Loss of Lubricating Grease Over Wide Temperature Range ..... **Page 149**

ASTM D2595, D2878

Laboratory Balance • m-Terphenyl • Air Supply • Cleaning Solvent

Dropping Point of Lubricating Greases ..... **Page 150**

ASTM D566, D4950, IP 132, ISO 2176, DIN 51801, FTM 791-1421

Spatula • Mineral Spirits

Dropping Point of Lubricating Grease Over Wide Temperature Range ..... **Page 151**

ASTM D2265,D4950

Mineral Spirits

Oxidation Stability of Lubricating Greases by the Oxygen Bomb Method ..... **Pages 152-153**

ASTM D942, IP 142, DIN 51808, FTM 791-3453

Oxygen • Forceps • n-Heptane • Oven • Sulfuric Acid
Distilled Water • Chromic Acid • Soap Powder

Corrosion Preventive Properties of Lubricating Greases ..... **Page 154**

ASTM D1743

Syringe, 100mL • Stoddard Solvent • Laboratory Oven
Isopropanol • Distilled Water • Ammonium Hydroxide

Copper Corrosion From Lubricating Grease by the Copper Strip Tarnish Test ..... **Page 155**

ASTM D4048, FTM 791-5309

Steel Forceps • Cotton Wool • Oven
Isooctane • Acetone

Roll Stability of Lubricating Grease ..... **Page 156**

ASTM D1831, MIL-G-10924SA

Spatula

Apparent Viscosity of Lubricating Greases ..... **Page 157**

ASTM D1092

Hydraulic Oil • Nitrogen • Flexible Tubing • Alcohol
Balance • Kerosene

Grease Mobility ..... **Page 158**

U.S. Steel Method

Nitrogen • Laboratory Balance

Low Temperature Torque of Ball Bearing Greases ..... **Page 159**

ASTM D1478, D4693, D4950, FTM 791-334

Stoddard Solvent • Oven • n-Heptane
Spatula • Desiccant

Low Temperature Torque of Grease-Lubricated Wheel Bearings ..... **Page 159**

ASTM D4693, D4950

Laboratory Oven • 1,1,1-Trichloroethane • Mercury
Ethylene Glycol • Ultrasonic Cleaner

Leakage Tendencies of Automotive Wheel Bearing Greases ..... **Page 160**

ASTM D1263, FTM 791-3454

Laboratory Balance • Spatula • n-Heptane

Life Performance and Accelerated Leakage Tendencies Tests for Automotive Wheel Hearing Greases ..... **Page 161**

ASTM D3527, D4290, D4950

Laboratory Balance • SAE Low Engine Oil • n-Heptane
Steel Wool • Penetone ECS • Oven • Stoddard Solvent • Isopropanol

Water Washout Characteristics of Lubricating Greases ..... **Page 162**

ASTM D1264, D4950, IP 215, FTM 791-3252

Distilled Water • Stoddard Solvent • n-Heptane

Resistance of Lubricating Grease to Water Spray ..... **Page 163**

ASTM D4049

Stoddard Solvent • n-Heptane

Oil Separation From Lubricating Grease ..... **Page 164**

ASTM D6184; FTM 791-321

Laboratory Oven • Laboratory Balance

Oil Separation On Storage of Grease ..... **Page 164**

IP 121

Laboratory Oven • Laboratory Balance

Oil Separation From Lubricating Grease During Storage ..... **Page 165**

ASTM D1742, FTM 791-322

Air Supply • Mineral Spirits

Bitumens and Waxes

Test Methods	Page
Ductility of Bituminous Materials ASTM D113, P226; AASHTO T51; ANS A37.11; Federal Specifications SS-R-406C; USDA Method 51 (BUL 12-16); IP 32; DIN 52013	**170**
Automated Softening Point of Bitumen (Ring-and-Ball Apparatus) ASTM D36, E28; AASHTO T53; IP 58; ISO 4625; DIN 52011; NF T 66-008; EN 1427, 13179	**171**
Softening Point of Bitumen (Ring-and-Ball Apparatus) ASTM D36, D2398, E28; AASHTO T53; IP 58, 198	**172**
Breaking Point of Bitumen, Fraass Method IP 80	**172**
Accelerated Aging of Asphalt Binder by Pressurized Aging Vessel (PAV) ASTM D6521	**173**
Effect of Heat and Air on Asphaltic Materials (Thin-Film Oven Test) ASTM D1754	**174**
Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin Film Oven Test) ASTM D2872	**175**
Float Test for Bituminous Materials ASTM D139; AASHTO T50; ANS A37.2	**176**

Test Methods	Page
Residue and Oil Distillate in Emulsified Asphalts by Distillation ASTM D244; AASHTO T59	**176**
Blocking and Picking Points of Petroleum Wax ASTM D1465; TAPPI T652	**177**
Melting Point of Petroleum Wax (Cooling Curve) ASTM D87; IP 55; ISO 3841; DIN 51570; FTM 791-1402	**178**
Oil Content of Petroleum Waxes ASTM D721; IP 158; ISO 2908; DIN 51571, 51572; FTM 791-5431	**179**
Solvent Extractables in Petroleum Waxes ASTM D3235	**179**

For information on additional testing methods for bitumens and waxes:

–Saybolt Color of Petroleum Waxes–please refer to pages 44, 46-47

–Water in Petroleum Products and Bituminous Materials by Distillation –please refer to pages 56-57

–Please refer to the Viscosity, Penetration, Flash Point and General Test Equipment Sections

Ductility and Elastic Recovery of Bituminous Materials

K80060 Constant Temperature Ductility Machine with Circulator

Test Method

Determines the ductility of a bituminous material by measuring the distancein which a sample will elongate before breaking when two ends of a briquetspecimen of the test material are pulled apart at a specified speed and temperature. Elastic Recovery is determined by pulling the briquet specimen to a specified distance at a specified speed and temperature. The briquet is then cut and the distance in which it takes for the two halves to reconnect is used to determine the elastic recovery of the test sample.

Semi-Automatic Ductility Testing Machine

- Conforms to ASTM D113, D6084 and related specifications
- Standard and Constant Temperature Models available
- Capable of testing up to 3 samples simultaneously
- 6" LCD Touch Screen Control Panel
- Pre-programmed with Ductility, Recovery, and Custom test methods
- Maximum travel length of 150 cm
- Variable traction speed from 0.25 to 7.0 cm/min
- Constant Temperature model equipped with Lexan Cover for enhanced temperature stability

Semi-Automatic Ductility Testing Machine designed explicitly for testing the ductility and elastic recovery of bituminous materials. Features a 6" LCD touch screen control panel. This integrated touch screen allows the user to choose between the ductility or recovery test methods. The custom menu allows for the input of desired speed and time parameters. During testing, the distance traveled by the specimen is displayed and a simple touch of the screen can record the distance traveled upon breakage of the briquet. A motor jogging feature permits locking of the sample carriage without additional movement after briquet sample is loaded into the machine.

Included Accessories

Standard Model:
Standard Mold (3)
Base Plate

Constant Temperature Model:
Circulation Bath
Remote Temp. Probe, 10 ft. length
Connection Tubing
Standard Mold (3)
Base Plate
Lexan Cover

Dimensions lxwxh,in.(cm)

Standard Model:
86¼x19x16 (219.1 x 48.3 x 40.6)
Net Weight: 200 lbs (91.7kg)

Constant Temperature Model:
86¼x19x16 (219.1 x 48.3 x 40.6)
Net Weight: 217 lbs (98.5 kg)

Circulation Bath:
15¾x8¼x22½ (219.1 x 48.3 x 40.6)
Net Weight: 50 lbs (22.7 kg)

Electrical Requirements CE

115V 60Hz
220-240V 50Hz
220-240V 60Hz

Shipping Information

Standard Model:
Shipping Weight: 350 lbs (159kg)
Dimensions: 92¾x 25¼x 23¼" (235.6 x 64.1 x 59.1cm)
Constant Temperature Model:
Shipping Weight: 368 lbs (167kg)
Dimensions: 92¾x 25¼x 23¼" (235.6 x 64.1 x 59.1cm)
Circulation Bath:
Shipping Weight: 74 lbs (34kg)
Dimensions: 22 x 10½ x 26½" (55.9 x 26.7 x 67.3 cm)

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 180 through 187.

Specifications

Conforms to the specifications of:
ASTM D113, D5892, D6084, P226; IP 32, 516; DIN 52013, EN 13398; NF T 66-006; AASHTO T 51, T 301; JIS K2207; ANS A37.11; Federal Specification SS-R-406C; USDA Method 5 (BUL 12-16)
Capacity: 3 molds with samples
Maximum Travel Length: 150 cm
Standard Traction Speed: 5 cm/min
Variable Traction Speed: 0.25 to 7.0 cm/min
Timer: 1-999 min

Ordering Information

Catalog No.	
K80050	Semi-Automatic Standard Ductility Testing Machine, 115V/220-240V 50/60Hz
K80060	Semi-Automatic Constant Temperature Ductility Testing Machine, 115V 60Hz
K80068	Semi-Automatic Constant Temperature Ductility Testing Machine, 220-240V 60Hz
K80069	Semi-Automatic Constant Temperature Ductility Testing Machine, 220-240V 50Hz

Accessories

K80012	Standard Mold
K80041	Recovery Mold
K80013	Base Plate
250-000-63F	ASTM 63F Thermometer, Range: 18 to 89°F
250-000-63C	ASTM 63C Thermometer, Range: -8 to 32°C
K80050-SFW	Semi-Automatic Ductility Software

Automatic Softening Point of Bitumen (Ring and Ball Apparatus)

Test Method

Determines the Softening Point of Bitumen in the range from 30 to 157°C (86 to 315°F) using the ring and ball apparatus immersed in distilled water (30 to 80°C), USP glycerine (above 80 to 157°C), or ethylene glycol (30 to 110°C).

Automatic Softening Point Apparatus

- Conforms to ASTM D36 and related test specifications
- Optical detectors for automatic measurement of softening point
- Data Storage: 200 Results
- Quick access to calibration parameters
- Auto diagnostic
- Four programmable preset test methods available
- Controllable heating rate and stirring speeds
- Preheating cycle
- Cooling by fan at the end of the test
- Waterproof heating element

K87800 Auto Softening Point Apparatus

Specifications

Conforms to the specifications of:
ASTM D36; AFNOR T66-008; EN 1427; ISO 4625; NF EN 1427; IP 58; DIN 52011

Included Accessories

Printer
Glass Beaker (2)
Shouldered Rings (10)
Load Balls (10)
Craddle
Pt 100 Probe
Detection Cable
Stirrer
RS232C Output

Electrical Requirements CE

115V 60Hz
230V 50Hz

Dimensions wxdxh,in.(cm)

Adapter: 10¼x21x20 (26x53.5x50)

Shipping Information

Shipping Weight: 44 lbs (20 kg)

Ordering Information

Catalog No.	
K87800	Automatic Softening Point Apparatus, 115V 60Hz
K87890	Automatic Softening Point Apparatus, 230V 50Hz

Accessories

K87800-1	Glass Beaker
K87800-2	Straight Rings, Pack of 10
K87800-3	Shouldered Rings, Pack of 10
K87800-4	Conical Rings, Pack of 10
K87800-5	Detection Lamp
K87800-6	Ring & Ball Cradle
K87800-7	PT 100 Probe
K87800-8	Heating Element, 1000W
K87800-9	Roll of Printer Paper
K87800-10	Load Ball, Pack of 10

Softening Point of Bitumen (Ring-and-Ball Apparatus)

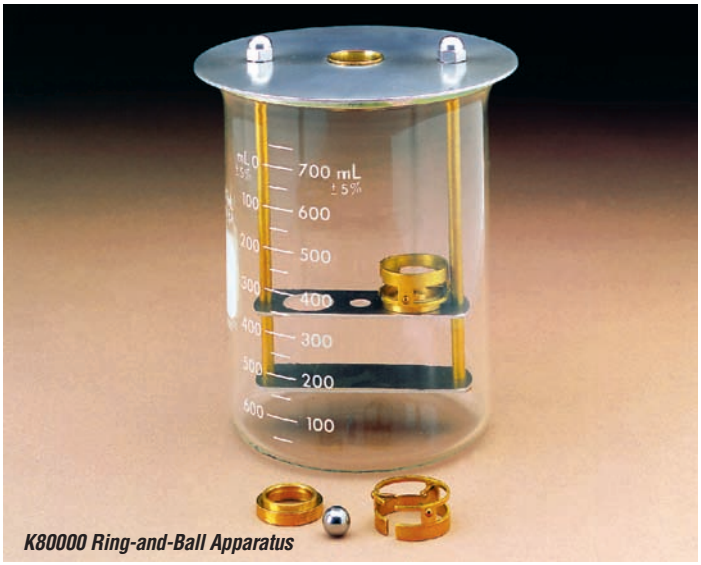
Test Method

The sample is cast in shouldered rings and heated at a controlled rate under the weight of a steel ball. The softening point is the temperature at which the bitumen disks soften and sag downward a specified distance.

Softening Point Apparatus

- Conforms to ASTM D36 and related specifications

Consists of 800mL beaker, 2 standard balls, shouldered rings, ball centering guides, ring holder, bottom plate and beaker cover with support rods. Order thermometer and heater separately.



K80000 Ring-and-Ball Apparatus

Ordering Information

Catalog No.		Order Qty
K80000	Softening Point Apparatus	1
	Accessories	
K42000	Powertrol Heater 1000W heater with variable stepless control and porcelain refractory top plate with positioning well for beaker. Enclosed in a stainless steel housing with cooling vents, Shipping Weight: 8 lbs, 14 oz (3.6kg). 115V 60Hz	
K42090	Powertrol Heater, 220-240V 50/60Hz	1
250-000-15F	ASTM 15F Thermometer Range: 30 to 180°F	1
250-000-15C	ASTM 15C Thermometer Range: –2 to +80°C	1
250-000-16F	ASTM 16F Thermometer Range: 85 to 392°F	
250-000-16C	ASTM 16C Thermometer Range: 30 to 200°C	
K80001	Ring. Brass, shouldered ring conforming to ASTM specifications. Pack of 10	
K80002	Ball. Hardened steel, conforming to ASTM specifications. Pack of 10	
K80003	Ball-Centering Guide	

Specifications

Conforms to the specifications of:
ASTM D36, E28; AASHTO T53;
IP 58, 198; NF T 66-008

Shipping Information

Shipping Weight: 4 lbs (1.8kg)

Breaking Point of Bitumen, Fraass Method

Test Method

Determines the breaking point of solid and semi-solid bitumens. A thin steel plaque is coated with the sample and flexed in a bending apparatus at descending temperatures until cracks appear in the sample coating.

Breaking Point Apparatus

- Conforms to IP 80 specifications

Consists of two concentric borosilicate glass tubes with movable steel plate holders. A cone-and-peg mechanism moves the inner tube up and down relative to the outer tube, which varies the distance between the plate holders, causing the stainless steel test plate to be flexed. The inner tube accommodates a test thermometer. Supplied with 12 spring stainless steel plaques.

Ordering Information

Catalog No.		Order Qty
K28300	Bending Apparatus	1
K28310	Cooling Apparatus Consists of test tubes, cylinder, bungs and thistle tunnel	1
K28320	Electric Hotplate, 115V 50/60Hz	1
K28321	Electric Hotplate, 220-240V 50/60Hz	
250-000-33C	ASTM 33C Thermometer. Range: –38 to + 42°C	1

Shipping Information

Shipping Weight: 20 lbs (9.1kg)
Dimensions: 2.5 Cu. ft.

Accelerated Aging of Asphalt Binder Using a Pressurized Aging Vessel (PAV)

Test Method

For accelerated aging (oxidation) of asphalt binders by means of pressurized air and elevated temperature. This is intended to simulate the type of changes which occur in asphalt binders during in-service oxidative aging but may not accurately simulate the relative rates of aging. It is intended for use with residue from Test Method D2872 (RTFOT) which is designed to simulate plant aging.

Pressure Aging Vessel (PAV)

The Pressure Aging Vessel (PAV) is used to simulate in service oxidative aging of asphalt binder according to procedures developed by the Strategic Highway Research Program (SHRP). The K88100 is fully compliant with the most recent ASTM and AASHTO standards for these tests. The complete PAV system consists of an ASME-code stainless steel pressure vessel in a stainless steel cabinet with encased band heaters, a precision sample holder for simultaneous testing of ten specimens, a set of ten TFOT specimen trays, a pressure controller, temperature controller, pressure and temperature measurement devices, temperature recorder, and a specimen loading and unloading tool.

The K88100 PAV takes the hassle out of running and documenting asphalt binder aging operations. Three easy, non-complicated steps produce accurate and reliable results. Just press the "heat" button, inset specimens when prompted and press the "Age" button and let the PAV do the rest. Custom status screens guide the user step-by-step through the entire process. Each display screen (preheat start-up, preheat ready, aging heat up, aging pressurized, and aging complete) is simple and direct, with detailed process and status information. The final output screen, when the test is complete, shows the current vessel pressure, as well as minimum and maximum temperatures achieved during the test procedure. Process data (temperature and pressure) is continually stored at regular intervals in the programmable logic controller (PLC) that controls and monitors the process.

The K88100 features a compact, bench top design with integral pressure vessel. Its rotating vessel lid with rounded support block provides easy opening and closing. A built-in timer accumulates and records out-of-range time (out of range time for the PAV is typically less than 10 minutes during a 20-hour test). Minimum and maximum temperature data is recorded and is displayed at the end of each test.

Specifications

Conforms to the specifications of:
ASTM D6521; AASHTO R28
Operating Pressure: 2.10 ± 0.05 MPa (304 psi)
Temperature Range: 90°C to 110°C (194°F to 230°F)
Temperature Control Resolution: ± 0.1°C
Test Temperature Uniformity: ± 0.5°C
Time to Set point: 3 hours from ambient
Return to Set point: 120 min. after preheating and lading of specimens
Pressure Vessel: ASME code section VIII, division 1; 1992 A 93
Maximum Pressure: 325 psi (2.24 MPa) at 120°C (250°F)
Pressure Safety Release: 325 psi (2.24 MPa)

Ordering Information

Catalog No.	
K88100	Pressure Aging Vessel, 230V 50/60Hz

Accessories

K88100-1	UPS Battery Backup System
K88100-2	PAV Verification Kit
K88100-3	PAV O-Ring
K88100-4	CGA Adapter
K88100-5	High Pressure Hose
K88100-6	Specimen Pans Set (Pk / 10)

Loss on Heating of Oil and Asphaltic Compounds

Effect of Heat and Air on Asphaltic Materials (Thin Film Oven Test)

Test Method

Determines the effect on asphaltic materials of heating in an oven under prescribed conditions. The results are reported in terms of change in sample mass and/or changes in selected properties such as viscosity, penetration and ductility as evidenced by test data taken before and after the oven cycle.

Asphalt Oven

Dual purpose oven for loss of heat test and thin film test for bitumen and asphaltic materials. Interior chamber of stainless steel and stored powder painter steel exterior. Double glazed window in door for viewing test chamber.

Side mounted controls comprise microprocessor digital control, independent overheat thermostat, main switch and indicator lamps. Two rotating platforms supplied to perform both the tests.

Specifications

Conforms to the specifications of:
ASTM D6, D1754; Specification E145, Type 1B; AASHTO T47, T179, BS2000
Temperature Range: to 356˚F (180˚C)
Pre-set at 163˚C ± 1˚C
Electrical Requirements: CE
110V 60Hz
220V 50Hz

Dimensions

Internal Chamber Dimension 38cm(H) x 52cm(W) x 46cm(D)
External Dimension 57cm(H) x 87cm(W) x 63cm(D)
(External Dimension does not include motor or handle)
Net Weight: 44kg

K45850 Loss on Heat / Thin Film Oven

Ordering Information

Catalog No.		Order Qty
K45850	Loss on Heat/Thin Film Oven for D6, D1754 110V, 60Hz	1
K45859	Loss on Heat/Thin Film Oven for D6, D1754 220V, 50Hz	

Accessories

388-001-003	Sample Container for ASTM D6	9
K17000	Thin Film Oven Pan, aluminum for D1754	4
K17090	Thin Film Oven Pan, stainless steel for D1754	4

Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin Film Oven Test)

Test Method

Determines the effect of heat and air on a moving film of asphalt to serve as an indicator of approximate change in properties during conventional hot-mixing. The results are reported in terms of the changes in selected properties such as viscosity, penetration and ductility brought about by the RTFO test, as evidenced by test data taken before and after the 75 minute oven cycle.

Rolling Thin Film Oven

- Conforms to the specifications of ASTM D2872

Double-walled electrically heated convection oven for rolling thin film oven tests on asphalts. Incorporates all required features per ASTM specifications, including: door with double-pane viewing window; symmetrical top and bottom vents; air plenum; squirrel cage-type 1725rpm fan; digital indicating thermostat to control oven temperature at 163°C ±0.5°C; vertical circular carriage to mechanically rotate the samples at 15 ±0.2rpm; air jets to blow heated air into each sample bottle at its lowest point of travel; and a calibrated flowmeter to control air flow at 4000mL/min. An overtemperature cut-off circuit disconnects power to the unit in the event of control failure.

Specifications

Conforms to the specifications of: ASTM D2872; AASHTO T240

Included Accessories

Glass Sample Container (8)
ASTM 13C Thermometer

Dimensions lxwxh,in.(cm)

40x36x26 (101.6x91.44x66.04)
Net Weight: 310 lbs (141kg)

Shipping Information

Shipping Weight: 380 lbs (173kg)
Dimensions: 7.96 Cu. ft.

Electrical Requirements CE

220-240V 60Hz
220-240V 50Hz

K88000 Rolling Thin Film Oven

Ordering Information

Catalog No.		Order Qty
K88000	Rolling Thin Film Oven, 220-240V 60Hz	1
K88001	Rolling Thin Film Oven, 220-240V 50Hz	
	Accessories	
K88000-1	Glass Sample Container	8
K88000-2	Cooling Rack	
250-000-13C	ASTM 13C Thermometer Range: 155 to 170°C	1

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Float Test for Bituminous Materials

Test Method

Provides a measure of the consistency of bituminous materials, including asphalts and tar products.

Float Test Apparatus

• Conforms to ASTM D139, AASHTO T50 and ANS A37.2 specifications Consists of aluminum float and three brass collars for determining the consistency of bituminous materials and tar products.

Shipping Information

Shipping Weight: 3 lbs (1.4kg)

Ordering Information

Catalog No.		Order Qty
K30500	Float Test Apparatus	1
	Accessories	
K30510	Float, only	
K30520	Collar, only	
250-000-15F	ASTM 15F Thermometer Range: 30 to 180°F	1
250-000-15C	ASTM 15C Thermometer Range: –2 to +80°C	

K30500 Float Test Apparatus

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Residue & Oil Distillate in Emulsified Asphalts by Distillation

Test Method

Determines residue and oil distillate in emulsified asphalt for research, quality control and specification acceptance purposes.

Residue and Oil Distillate Determination Apparatus

• Conforms to ASTM D244 and AASHT0 T59 specifications Consists of an aluminum alloy still with lid and clamp assembly, ring burner, connection apparatus, graduate cylinder and thermometers.

Shipping Information

K31900: Shipping Weight: 7 lbs (3.2kg)
Dimensions: 1.3 Cu. ft.
K31956: Shipping Weight: 18 lbs (8.2kg)
Dimensions: 2.8 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K31900	Aluminum Alloy Still	1
	Accessories	
K31910	Ring Burner, 5" (12.7cm) dia	1
K31956	Connection Apparatus Includes Borosilicate Glass condenser with metal jacket, tin shield, clamps and stand	1
332-002-003	Graduated Cylinder, 100mL	1
250-000-07F	ASTM 7F Thermometer Range: 30 to 580°F	2
250-000-07C	ASTM 7C Thermometer Range: –2 to +300°C	

K31900 Metal Still

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Blocking and Picking Points of Petroleum Wax

Test Method

Blocking point and picking point are indicators of the temperature above which surface film injury will occur when waxed surfaces come in contact with one another as on a roll of wax paper. Paper test specimens are coated with the wax sample, folded with the waxed surfaces together, and heated on a metal blocking plate having a measured temperature gradient. After a specified period, the specimens are removed and unfolded, and the points at which film disruption occurred are noted together with their corresponding temperatures.

Blocking and Picking Points Apparatus

- Conforms to ASTM D1465 and TAPPI T652 specifications
- Choice of Type A or Type B Blocking Plates

Applies wax samples to paper test specimens and creates a temperature gradient for determining blocking point and picking point temperatures.

Wax Coating Device–Coats paper with wax samples per ASTM specifications. Consists of an insulated electrically heated hot wax bath and a cooling water bath with doctor rods and paper roller. Variable auto transformer and 200W heater situated underneath the hot wax bath heat sample to a temperature above the melting point. Doctor rods connect to an external hot water supply to maintain proper temperature. Cooling bath has water inlet/outlet fittings, and each bath has a built-in paper guide.

Blocking Plates–Choice of Type A or Type B plates per ASTM specifications. Type A Aluminum Blocking Plate uses a strip heater and cooling coil on opposite ends of the block to create a temperature gradient. Six thermocouples along the length of the block input to accessory Digital Thermometer. Accommodates eight rows of paper test specimens.
Type B Aluminum Blocking Plate uses two thermostatically controlled baths to establish a temperature gradient, with the ends of the plate extending into the baths. Cold bath has a cooling coil and 100W immersion heater; hot bath has a 300W immersion heater. Thermoregulators and motor stirrers provide uniform temperature control in each bath. Ten thermocouples along the length of the block input to accessory Digital Thermometer. Accommodates six rows of test specimens.

Digital Thermometer–Ten-channel microprocessor based digital thermocouple thermometer with large LED display. Ten-position front panel rotary selector switch. Mounted in a heavy duty bench case.

Specifications

Conforms to the specifications of: ASTM D1465; TAPPI T652
Electrical Requirements: CE
Wax Coating Device: 115V 60Hz, Single Phase, 1.7A
220-240V 5060Hz, Single Phase, .9A
Type A Blocking Plate: 115V 60Hz, Single Phase, 2.1A
220-240V 50/60Hz, Single Phase, 1.1A or
Type B Blocking Plate: 115V 60Hz, Single Phase, 3.4A
220-240V 50/60Hz, Single Phase, 1.8A

Included Accessories

Type A Blocking Plate:
Steel weights, 1x1x30"(8)
Sponge rubber pads (8)
IC thermocouples (6) or
Type B Blocking Plate:
Steel weights, 1x1x6" (24)
Sponge rubber pads (8)
IC thermocouples (10)

Dimensions lxwxh,in.(cm)

Wax Coating Device: 19x8x12 (48x20x30)
Type A Blocking Plate: 38x12x2 (97x30x5)
Type B Blocking Plate: 19x8x12 (48x20x30)

Shipping Information

Shipping Weight:
Wax Coating Device: 44 lbs (20kg)
Type A Blocking Plate: 164 lbs (74.4kg)
Type B Blocking Plate: 183 lbs (83.0kg)
Dimensions:
Wax Coating Device: 5.3 Cu. ft.
Type A Blocking Plate: 4.1 Cu. ft.
Type B Blocking Plate: 12.3 Cu. ft.

Ordering Information

Catalog No.		Order Qty
Wax Coating Device		1
K17100	Wax Coating Device, 115V 60Hz	
K17190	Wax Coating Device, 220-240V 50/60Hz	
Blocking Plates		1
K17200	Type A Blocking Plate, 115V 60Hz	
K17290	Type A Blocking Plate, 220-240V 50/60Hz	
K17300	Type B Blocking Plate. 115V 60Hz	
K17390	Type B Blocking Plate. 220-240V 50/60Hz	
Digital Thermometer		1
K29310	Digital Thermometer, 115V 60Hz	
K29319	Digital Thermometer, 220-240V 50/60Hz	
K17110	Test Paper, Cereal glassine, 30 lb basic weight. 3½" (8.9cm) wide x 6" (15.25cm) dia. roll on a 3" (7.6cm) dia. core.	1
Thermometers		2
Use with Type B Blocking Plate only.		
250-000-09F	ASTM 9F Thermometer Range: 20 to 230°F	
250-000-09C	ASTM 9C Thermometer Range: –5 to +110°C	

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Melting Point of Petroleum Wax (Cooling Curve)

K17500 Wax Melting Point Apparatus

Test Method

Periodic temperature measurements are taken of a sample of molten wax as it is cooled in an air bath. When the wax solidifies, a plateau in the cooling curve occurs, indicating the melting point (cooling curve) of the sample.

Wax Melting Point Apparatus

- Conforms to ASTM D87 and related specifications

Cools molten wax samples in accordance with ASTM and related specifications. Consists of nickel-plated air and water bath assembly with removable cover. Supports test tube in a vertical position in the air bath.

Specifications

Conforms to the specifications of:
ASTM D87; IP 55; ISO 3841; DIN 51570; FTM 791-1402; NF T 60-114

Included Accessories

Test Tube, Thermometer Holders (2)

Dimensions

dia.xh,in.(cm) 5½x7 (14x18)
Net Weight 4 lbs (1.8kg)

Shipping Information

Shipping Weight: 6 lbs (2.7kg)
Dimensions: 0.7 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K17500	Wax Melting Point Apparatus	1
	Accessories	
250-000-14F	ASTM 14F Thermometer Range: 100 to 180°F	2
250-000-14C	ASTM 14C Thermometer Range: 38 to 82°C	
K175-0-8	Test Tube, 25x100mm	

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Oil Content and Solvent Extractables in Petroleum Waxes

Oil Content of Petroleum Waxes

Solvent Extractables in Petroleum Waxes

Test Method

Oil content or solvent extractables in wax can affect key properties such as strength, hardness, melting point, etc. The sample is dissolved in methyl-ethyl ketone or a 50-50 mixture of methyl-ethyl ketone and toluene, cooled to precipitate the wax, and filtered. The oil content or solvent extractables content of the filtrate is then determined by evaporating the solvent and weighing the residue.

Oil-Solvent Extractables Content Apparatus

- Conforms to ASTM D721, D3235 and related specifications

Determines oil content or solvent extractables content in petroleum waxes in accordance with ASTM specifications. Includes Filter Stick Assembly; Cooling Bath; Air Pressure Regulator; and Evaporation Cabinet.

Filter Stick and Assembly–Filters petroleum wax samples per ASTM specifications. Consists of 10mm diameter sintered glass filter stick with air pressure inlet tube and delivery nozzle, and a 25x170mm test tube. Inserts in Cooling Bath.

Cooling Bath–Accommodates three (3) 25x170mm test tubes for cooling samples and filter stick assemblies. Insulated stainless steel tank with finished steel exterior. Removable composition top plate has thermometer port, filling port and three 25.4mm (1") test tube ports. Fill tank with suitable cooling mixture.

Air Pressure Regulator–Controls air flow to the filter stick assembly at the required rate. Mercury bubbler-type, with 250mL glass cylinder, T-tube and rubber stopper.

Evaporation Cabinet–Thermostatically heated cabinet evaporates solvent from filtrate per specifications. Accommodates four weighing bottles. Delivers air stream vertically downward into bottles through glass jets. Manifold assembly is adjustable for positioning of jets at the correct height above the sample surface. Controls temperature at 35 ±1°C (95 ±2°F). Finished steel cabinet with composition front plate and hinged glass door.

Ordering Information

Catalog No.		Order Qty
K17600	Oil-Solvent Extractables Content Apparatus, 115V 60Hz	1
K17690	Oil-Solvent Extractables Content Apparatus, 220-240V 50/60Hz	
	Accessories	
K17605	Mechanically Refrigerated Cooling Bath, 115V 60Hz, Ambient to -35°C	
K17695	Mechanically Refrigerated Cooling Bath, 220-240V 50/60Hz, Ambient to -35°C	
332-004-009	Test Tube, 25x170mm	4
250-000-71F	ASTM 71 F Thermometer Range: –35 to +70°F	1

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 184 through 191.

Specifications

Conforms to the specifications of:
ASTM D721, D3235; IP 158; ISO 2908; DIN 51571, 51572; FTM 791-5431
Electrical Requirements: CE
115V 60Hz, Single Phase, 0.8A
220-240V 50/60Hz, Single Phase, 0.4A

Included Accessories

Weighing Bottles, 15mL (4)
Filter Stick Assembly (K17630)
Air Pressure Regulator (K17640)

Dimensions lxwxh,in.(cm)

Cooling Bath: 8x6x9 (20x15x23)
Evaporation Cabinet: 9x5x16 (23x13x41)
Net Weight:
Cooling Bath: 6 lbs (2.7kg)
Evaporation Cabinet: 7 lbs (3.2kg)

Shipping Information

Shipping Weight: 24 lbs (10.9kg)
Dimensions: 5 Cu. ft.

Additional Accessories

Additional equipment, materials and/or reagents are required to perform some of the test procedures in the preceding pages. Please refer to the applicable test method for further information, or contact Koehler for assistance.

Ductility of Bituminous Materials ..... Page 170

ASTM D113, D-4; AASHTO T51; ANS A37.11; Federal Specification SS-R-406C; USDA Method 51 (BUL 12-16); IP 32; DIN 52013

Glycerin
No. 50 300 µm Sieve
150mL Beaker, Griffin Low-form
Carbon Disulfide
Celite Analytical Filter Aid (CAFA)
Evaporating Dish
Analytical Balance
Suction Pump
Filtering Crucible, Porcelain
Dextrin, Talc or Kaolin
Spatula
30mL Beaker, Griffin Low-form
Drying Oven
Watch Glasses
Desiccator
Filtering Flask, with Crucible Adapter
Bunsen Burner or Muffle Furnace

Softening Point of Bitumen (Ring-and-Ball Apparatus) ..... Page 171-172

ASTM D36, E28; AASHTO T53; IP 58, IP 198

Distilled Water
Ethylene Glycol
Silicone Oil or Grease
Dextrin or Talc
Spatula

Breaking Point of Bitumen ..... Page 173

IP 80

Acetone
Solid Carbon Dioxide

Effect of Heat and Air on Asphaltic Materials ..... Page 174

ASTM D1754

Laboratory Oven with Rotating Shelf
Analytical Balance

Float Test for Bituminous Materials ..... Page 176

ASTM D139; AASHTO T50 and ANS A37.2

Spatula

Residue and Oil Distillate in Emulsified Asphalts by Distillation ..... Page 176

ASTM D244 and AASHTO T59

No. 50 300 µm Sieve
No. 20 850 µm Sieve
Condenser
Xylol

Blocking and Picking Points of Petroleum Wax ..... Page 177

ASTM D1465; TAPPI T652

Trimming Board
Analytical Balance
Paper Cereal Glassine

Melting Point of Petroleum Wax (Cooling Curve) ..... Page 178

ASTM D87; TAPPI T630M-61; IP 55; ISO 3841; DIN 51570; FTM 791-1402

Heating Device

Oil Content of Petroleum Waxes Solvent Extractables in Petroleum Waxes ..... Page 179

ASTM D721, D3235; TAPPI T636; IP 158; ISO 2908, DIN 51571, 51572; FTM 791-5431

Dropper Pipet, 15mL
Transfer Pipet, 15mL
Analytical Balance
Wire Stirrer
Methyl Ethyl Ketone
Toluene
Anhydrous Calcium Sulfate
Air Supply
Drying Oven
Kerosene
Cotton